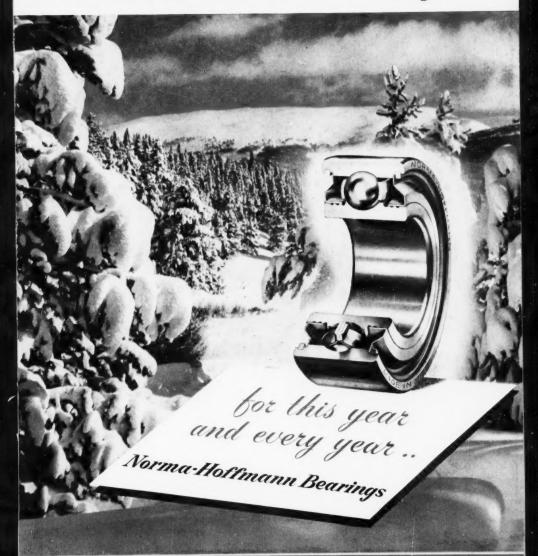
# Modern January, 1950 Machine Shop



ORMA-HOFFMANN BEARINGS CORP'N, STAMFORD, CONN., FOUNDED 1911



### Send FOR THIS CATALOG

It will acquaint you with the complete line of GORTON TRACER-CONTROLLED MAGHINE TOOLS and Accessories

Send for your copy today. Gorton tracer-controlled milling embodies distinct advantages on the production line and in the tool room. In many cases, special tooling will make a given operation entirely automatic. Send for the Gorton Condensed Catalog illustrated above or for any of the other specialized bulletins described below—they were published for your information and reference.



0-16A VERTICAL Incorporates all of the desirable features of former 8-D. Also available with swivel or universal head. Bulletin 2240.





2-28B HORIZONTAL
No. 2 size, fullwidth
No. 2 size, fullwidth
No. 1 size, fullwidth
No. 2 size, fullwidth
No. 2



3-U PANTOGRAPH Sturdy and rigid with sensitive tracer control. Larger and heavier 3-Z model also available. Bulletin 1580



PI3 PANTOGRAPH.

†Ratiobar Pantogra h
for 3-dimensional work
first basic design in
provement in pantograph construction
Bu'letin 2310.

\*Trade Mark Reg. U. S. Pat. Office

375-2
CUTTER GRINDER
Universal type; bench
or floor models; capacity up to %" dia.
including ball nose and
multi-flute cutters.
Bulletin 1817.



16-B AUTOMATIC LATHE
For precision turning of long stender parts from .005" dia., by 1/32" long to \(\frac{7}{30}\)" long. Bulletin 1800.

†Pats. Applied For

GEORGE CORTON

1701 Racine Street, Racine, Wisconsin, U.S.A.

Please Send at Once

For brief facts about the Gorton interest of tracercontrolled machines, use coupon or company letterhead and request Bulletin [655] illustrated above. For specific information on certain machines, see text accompanying each illustrations.

madration.
Name
Title
AddressState

Dept. 1701

VOLUME 22 NUMBER 8 JANUARY, 1950

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# Mochine Shop outents

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LANDEX HEAD

LANDMACO THREADING MACHINES



CUTTING



BETTER THREADS LANDIS METHODS

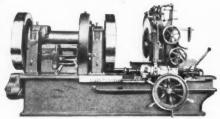
• The LANDIS LINE, offering equipment designed to perform many types of threading operations, has a worldwide reputation for precision accuracy and high-speed production.

TAPPING AUTOMATIC

NIPPLE MACHINE



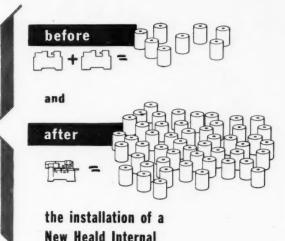
CENTERLESS THREAD GRINDER



PIPE THREADING & CUTTING OFF MACHINES



# one hour's grinding production



In case you didn't count them, there are fifty cam rollers in the "after" picture — compared to eight "before." That's how much difference a New Heald Model 271 Size-Matic Internal Grinder was able to make in the production picture of a textile machinery manufacturer. Before this Heald machine went on the job, these cam rollers were finished on two older

type grinders. Now one Model 271 turns out

This machine grinds a variety of textile cam rollers, to a tolerance of .0005" for size. In the case of one part, with a long bore, a damped quill is used to help eliminate the possibility of chatter and resultant unsatisfactory finish.

This is a typical example of how Heald engineering can help to step up production schedules and cut the cost of precision finishing operations.

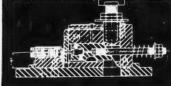


Indianapolis . Lansing . New York

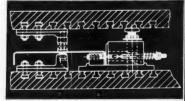


Extruded shapes, ells, angles and other molded, shaped or fabricated pieces are easily pierced from the side at 90° with HU-50 Perforating Units. Quickly set up and adjustable, these units may be used separately or with standard perforating equipment. The advantages provided by other Whistler Adjustable Dies are retained. Absolute accuracy is assured. Quick change-over of hole arrangements can be made...in many cases, on the press. Production economies and speeded up operating schedules are effected. Continued re-use of units in different groupings spreads initial cost. It makes sense to look into the use of Whistler Adjustable Dies for all perforating, notching, slitting or rounding operations.

First Public Showing of Whistler Magnetic Dies at Work— Booth 832—ASTE Convention—April 10-14—Philadelphia



Detailed drawing showing operation of HU-50 90° Perforating Unit.



Typical set-up shows 90° perforating unit operated in conjunction with standard perforating equipment.

#### DETAILS EXPLAINED IN CATALOG NO. 48

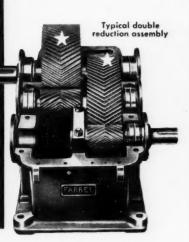
Get the facts about this 90° perforating unit in a hurry. Your copy of this catalog will be sent at once upon request.



# S. B. WHISTLER & SONS, Inc.

740 Military Road • Buffalo 17, N.

SINGLE
AND DOUBLE
REDUCTION
GEAR UNITS
with a
BACKBONE\*





For the full story of the many features of Farrel speed reducers, send for a copy of new Bulletin 449. Farrel speed reducers have recently been completely re-engineered, and the line has been expanded to give a wider range of sizes and capacities. Ratios of single reduction units range from  $1\frac{1}{2}$ :1 to 10:1; double reduction units from 10:1 to 60:1; triple reduction units from 82 to 318.

All of these reducers are equipped with Farrel - Sykes continuous - tooth, herringbone gears—the famous Gear with a Backbone—which provide extra strength and high load-carrying capacity. Because they are generated with a high degree of precision, these gears are extremely quiet in operation and give many years of trouble-free service.

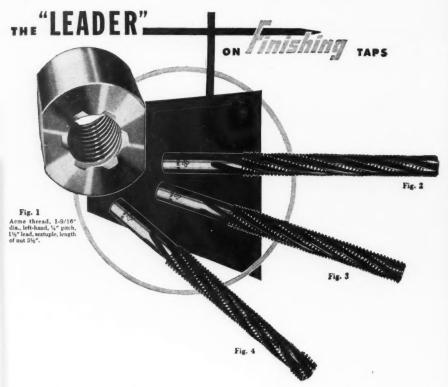
#### FARREL-BIRMINGHAM COMPANY, INC. 344 VULCAN STREET, BUFFALO 7, N. Y.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Cleveland, Detroit, Chicago, Los Angeles, Tulsa, Houston

FB-549

Farrel-Birmingham

Forrel Speed Reducers



NO...this is not a self-applied pat on our own backs. Here's the story...and the pictures.

FIG. 1...shows a difficult tapping operation successfully performed with a set of 3 H-W "Finished Taps"... (finished after hardening). FIG'S. 2-3-4...show the two reasons for the successful job...one, the spiral flutes at right angle to the thread, which give correct cutting

action to both sides of the teeth...two, the "Leader" sections on taps (Fig's. 3-4), which correctly engage the thread cut by the first tap (Fig. 2), and follow exactly the same accurate path. This thread had to be chased until Hanson Process taps were used. The economy of "Finished Taps" is therefore evident...as are the design and accuracy of H-W taps.

HANSON-WHITNEY MACHINE CO., HARTFORD 2, CONN.
Division of Whitney-Hanson Industries, Inc.

Valuable engineering, illustrated catalog on request. Please use your business stationery.



thwso '



# Save you time and money... INCREASE PRODUCTION!

Darned clever, these production men!

Note the use of this Gisholt No. 3 Ram Type Turret Lathe. In addition to handling all the typical drilling, boring, facing and reaming operations on the inside of a small motor housing, this turret lathe is used to:

Broach the keyway
Press in a bushing

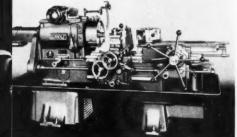
Finish machine in place

The entire operation on these parts takes only 1.37 minutes. Figure the time and cost

saved in not having to transfer parts to other machines—or other departments—for these operations.

Don't overlook the many ways you can get greater production from your turret lathes.

Don't overlook the many ways you can get greater production from your turret lathes. Gisholt engineers have all kinds of moneysaving ideas to help you with your problems. Ask one to call. Or write us.





It No. 3 Universal Ram

Type Turret Lathe

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of vound and parts. Your problems are welcomed here.

#### GISHOLT MACHINE COMPANY Madison 10, Wis.



# Going

#### **PRECISION**

Left: CINCINNATI FILMATIC No. 2 Centerless Grinding Machine. Complete details may be obtained by writing for catalog G-591.



Close-up of loading device, mounted on CINCINNATI FILMATIC No. 2 Centerless, developed by Cincinnati Application Engineers to grind the entire length of armature shafts. The grinding wheel has been removed to show the equipment to better advantage.

# CRINDING COSTS





#### ON LOWER LEVEL

Precision grinding costs always go down when Cincinnati Application Engineers take over. In this example, they have developed equipment for automatically grinding armature shafts at a high rate of production.

¶ A hydraulically operated magazine type loading fixture automatically lowers the parts to work rest height. Positioning, grinding to size, and ejecting is accomplished with a hydraulic automatic infeed attachment, synchronized with a work positioning and ejecting device. Both wheels are equipped with a new type of precision profile truing device having antifriction bearing slides.

#### CINCINNATI APPLICATION ENGINEERS

want a chance to show you what can be done to reduce the cost of your precision grinding operations. Send us a resumé of your problems, or ask for one of our fieldmen to visit you.



#### CINCINNATI GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U.S.A.

ENTER TYPE GRINDING MACHINES . CENTERLESS LAPPING MACHINES . CENTERLESS GRINDING MACHINES

# TW A tilting, sw plates and or complicate or complicate. Here's 70hy Exceptional

# THE KNIGHT

# DOES THE WORK OF TWO OR MORE MACHINES

A tilting, swivel table that entirely eliminates special jigs, angle plates and other expensive fixtures usually required for special or complicated milling, boring or shaping jobs.

Exceptional capacity and flexibility make it easy for the Knight No. 40 to do jobs which often require transfers to two or more special machines.

Sixteen table and spindle feed changes plus four vertical spindle feeds allow the use of a wide range of cutting tools.

Correctly located full vision controls for direction, speeds and feeds provide the most in convenient, simple operation.

Heavy, strong, one-piece column casting, wide accurate bearings and precision gearing insures the rigidity which means absolute accuracy and long service life.

Mail The Coupon Today For Catalog

## W.B.KNIGHT

MACHINERY COMPANY



3920 WEST PINE BLVD. ST. LOUIS 8, MISSOURI ATTACH TO COMPANY LETTE

W. B. KNIGHT MACHINERY CO., 3920 West Pine, St. Louis Send catalog on Knight No. 40 and other milling machines.

Name

Title

MORE GOODS for MORE PEOPLE at LOWER COST

# Beat Costly Obsolescence with Shapers MATCHED FOR THE JOB

MODERNIZE

with FEME

PRECISION SHAPERS

#### ... to CUT PRODUCTION COSTS and INCREASE PROFITS

GEMCO Shapers provide a 3-way efficiency...ruggedness, precision, adaptability. In 3 models... for average machine shop work (PLAIN); for heavy production work (PRODUCTION); for tool and die work, etc. (UNIVERSAL). IN SIZES FROM 16" TO 36" INCL.

In these New Model Universal Shapers, GEMCO engineers have incorporated new, additional features...

- Built-in horizontal and vertical Power Rapid Traverse.
- 2. Built-in horizontal and vertical Selective Feed.
- 3. All controls unilaterally located for Ease in Operation.
- Twin Bull-Gear Drive for longer operating life.
- Superior design enabling quick, easy Servicing when necessary.

THEY'RE LUBRIGARD PROTECTED

WRITE FOR BULLETIN GC-135

GENERAL ENGINEERING & MFG. CO.

MANUFACTURERS OF PRECISION MACHINERY SINCE 1917

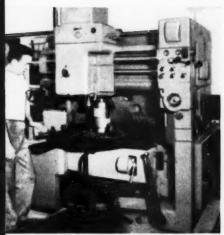
4417 OLEATHA AVE. . ST. LOUIS 16, MO.



# **GEARS...without**



## GTOWI... FOR MARINE PROPULSION



The Fellows No. 36 Gear Shaper installed for cutting production-run quantities of speed reduction and reverse gears at Snow and Nabstedt Gear Corp., New Haven, Conn.

The massive rigidity of this big No. 36 Gear Shaper opens up broad avenues of time saving in the cutting of heavy-duty precision gears with helical, spur or herringbone teeth... Power to hog out stock and precision to hold finish cuts to "tenths"... Speed and feed changes made in seconds...Well worth investigating! Complete literature on request.

#### ROUGHING AND PRE-SHAVING PERFORMANCE

at Snow & Nabstedt Gear Corp., New Haven, Conn. - manufacturers of S-N Marine Reverse and Reduction Gears.

WORK: 57-tooth Herringbone Gear, 14.250 inches P.D....and 25-tooth Mating Pinion, 6.250 inches P.D. (both SAE 8620 steel)

#### TOOTH CHARACTERISTICS:

Diametral Pitch	4/5
Pressure Angle	20 degrees
Helix Angle	23 degrees
Face Width	3.375 inches
Whole Tooth Depth	.475 inches

8
.0225 inche

#### ROUGHING TIME: (Material Normalized

Prior to Cutting)		
Gear (in one cut)	26.5	minutes
Pinion (in one cut)	13.5	minutes

#### PRE-SHAVING:

(After Carburization)	
Gear (in one cut)	23.5 minute
Pinion (in one cut)	10.5 minute

#### SAME GEARS SHAVED ON FELLOWS SHAVING MACHINES

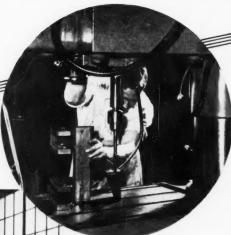
with minimum stock removal, minimum correction needed.

Ellows

THE FELLOWS GEAR SHAPER COMPANY . Head Office and Export Department, 78 River Street, Springfield, Vermont, U.S.A. Branch Offices: 616 Fisher Bldg., Detroit 2 . 640 West Town Office Bldg., Chicago 12 . 2206 Empire State Bldg., New York 1.

# FOSDICK Sensitive RADIALS

for greater efficiency on more operations!



Illustrating an interesting job being drilled on a FOSDICK Sensitive RADIAL at the plant of Benjamin E. Jarvis, Newark, N. J. One of the outstanding advantages of this new FOSDICK Sensitive RADIAL is the big increase in range of sensitive operations it can handle—easily—quickly—economically.

The one piece column provides additional strength and rigidity. The adjustable table which can be moved either by power or hand assures work in correct position for the job at hand. The flexibility of the table and arm, both of which swing in an arc of 360° on the column, permits a wide range of work to be handled and the arm at fixed height assures ease of operation on all jobs.

The machines are available in 3 and 4 foot sizes. There are nine spindle speeds and four feeds and both speeds and feeds are controlled by direct reading levers on the head.

For complete details write for the Fosdick Sensitive Radial Bulletin, S.R.M.M.S.

**FOSDICK** 

MACHINE TOOL CO. CINCINNATI 23, OHIO





Particular Craftsmen the world over depend on Jarvis Rotary Files to do their most precise filing. Equally effective on steel or bronze, magnesium or aluminum, plastic or wood composition, many-shaped Jarvis Rotary Files come with coarse, standard, fine, super-fine, diamond or herringbone flutings—specials for special jobs. Rigid quality control and most advanced production methods make these ground-from-the-solid files better than ever before. Used with Jarvis Flexible Shaft Machines, they make a perfect combination for dependable, quality production. For free literature write to The Charles L. Jarvis Company, Middletown, Connecticut.



TAPPING ATTACHMENTS • TECNI-TAPS and DIES • ROTARY FILES FLEXIBLE SHAFTS and MACHINES • QUICK CHANGE CHUCKS and COLLETS

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

# Now in the 3hp range.. FOUR NEW MACHINES FEATURING



steel wedge plates. Fine finish required. With new Kearney & Trecker 3 hp Model 24-AC machine, operator sets up automatic table

ing alternately. RESULT: 28% savings in loading time, reduced scrap, more uniformity, less operator fatigue.

# KNEE-TYPE MILLING MONO-LEVER CONTROL

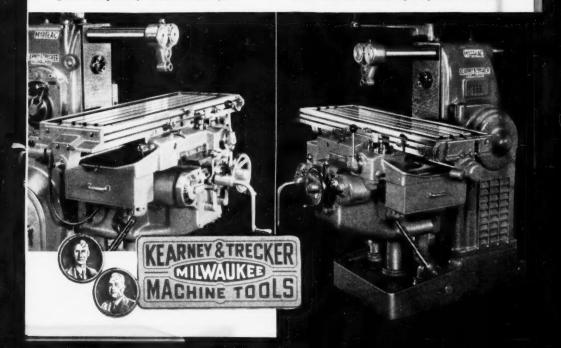
YOU asked for them — Kearney & Trecker milling machines in the 3 hp range with Mono-Lever Control and Automatic Table Cycle. Here they are — your choice of two different styles, plain or vertical with either 18" or 24" table feed.

These machines offer you features never before available on machines of this size and type: 33% larger table working area plus built-in deep-well coolant troughs all around — extra large (2" dia.) precision-ground table screw with adjustable nut to eliminate backlash — drawer-type chip containers for easy chip removal — positive metered lubrication of the saddle and table ways and table feed mechanism — six-way power rapid traverse — automatic spindle stop — and quick-change feed and speed selection.

Don't wait. It costs you nothing to find out today about these new machines. See how they can meet all around big or small job requirements in your shop. For detailed information call our nearest representative or write direct to Kearney & Trecker Corporation, 6784 West National Ave., Milwaukee 14, Wis.

You get 33% more table working area on these new machines — 38" x 14" on Model 18-AC and 44" x 14" on Model 24-AC. This means greater adaptability to handle more jobs.

New 3 hp Model 24-AC plain style Kearney & Trecker milling machine featuring Mono-Lever Control and Automatic Table Cycle . . ask about it or the vertical style equivalent today!





The Horton releaser is the secret! This ingenious device . . . exclusive with Horton . . . acts independently of the tightening screw, prevents binding and jamming, saves valuable time, extends chuck life.

Expert heat-treating, precision machining, and top-quality alloy steel guarantee maximum gripping power and accuracy within .003 indicator reading for full range.

Specify Horton Keyless Drill Chucks . . . with the exclusive Horton releaser and ball bearings . . . for longer wear and better service.

Also see our complete line of hand and power-operated lathe chucks.

Call your local distributor, or write for new catalog sheets.

#### write for new The E. HORTON & SON Co.

WINDSOR LOCKS . CONNECTICU



#### PULLMAN-STANDARD FINDS MANY USES FOR STEELWELD PRESS





A few of the many parts produced within a short period on the Steelweld Press. Curves and bends of every shape and degree are formed quickly and accurately. "The more we use our Steelweld Bending Press, the more we learn about what it can do for us", said the Day Superintendent of Pullman-Standard Car Mig. Co., Butler, Penna. "As a result it is handling more and more of our work. We are doing a great many forming jobs on it that did not occur to us as being possible when we first installed the machine."

An endless variety of parts are produced on this press. These are mostly of ¼ and ¾ inch steel plate and involve curves and bends of every description for gussets, fulcrums, braces, frames, housings, etc. used in the manufacture of railroad cars.

The dies used are relatively simple and made in the company's shop. Because dies are easily changed, it usually takes about an hour to set up for a new job.

If you work with metal plate in any thickness up to one inch, for bending, forming or punching, you should get the facts on the many features of Steelweld Presses.



#### THE CLEVELAND CRANE & ENGINEERING CO.

6430 East 281st Street - Wickliffe, Ohio



## STEELWELD

BENDING PRESSES

BRAKING - FORMING - BLANKING - DRAWING - CORRUGATING - PUNCHING



# POWER plus CONTROL

#### For Profitable HEAVY-DUTY DRILLING

"BUFFALO" No. 21 DRILLS are the answer to those "pressure" schedules you often have to meet in general shop work. Rugged and powerful, they're capable of continuous, heavy work up to 11/2" in cast iron. And their controls allow operators to "eat up the work" easily and accurately. Eight quickly changed speeds-four convenient feeds-direct or back-geared drive-simple crank controls for fast setup changes—automatic depth control—make this possible. IT MEANS YEARS OF LOWER COST DRILLING! Why not get the facts on this popular "Buffalo" machine? Simply write for BULLETIN 3746.

#### **BUFFALO FORGE** COMPANY

388 Broadway Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.





# New, Unique Simplicity!...

in custom-engineered

ELECTRONIC

INSPECTING

AND SORTING

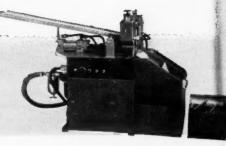
**EQUIPMENT** 

Through basic engineering developments, Brown & Sharpe is able to custom-build uniquely simple inspecting and sorting machines for precision parts. Machines of this description made by Brown & Sharpe have the advantages of simpler, sturdier construction; more stable adjustments; and easier manipulation of sensitivity.

Why not turn over your problem of getting machines like these to Brown & Sharpe? Learn what Brown & Sharpe can offer in custom-built inspecting and sorting machines, from manual loading and disposal to fully automatic. Send requirements outline to Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.



This single-motor, compact machine automatically gages and sorts antifriction bearing rolls. It rejects rolls above or below mfg. tolerance and separates accepted rolls into 5 sized categories, in increments of .00002".



.00002". This machine gages and sorts straight sleeves into four categories — measuring for length as well as diameter at both ends. Its production

rate is approximately 3000 per hour.



You can save hundreds of dollars a year with this Atlas miller on the job for small parts milling.

Its original cost is low — \$315 for the Change-O-Matic machine, F.O.B., Kalamazoo, less arbor and motor. It will save many hours a month on set-ups — save on power and operating costs — and free your big machines for the jobs that only they can handle.

The Atlas handles the full range of milling from slabbing and facing cuts to end milling, keyways, finishings, and layout work. It is a precision machine in every respect—valuable in tool room or laboratory—ruggedly built for round-the-clock production. Adding air chucks gives you a semi-automatic producer at exceptionally low cost.

Send for new catalog — just off the press — with complete specifications and operating details.

#### Atlas Press Co.

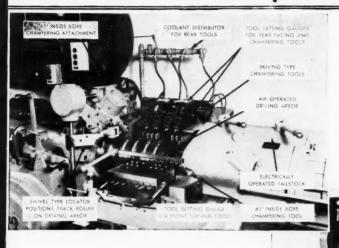
146 N. PITCHER STREET KALAMAZOO, MICHIGAN



MATCHED PRECISION TOOLS FOR

# MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-owing PEOPLE" SENECA FALLS, NEW YORK



Close-up view of tooling.

Overall view of machine showing rough and finished work.

# MODEL R-14 So-swingy Lathe Cuts Machining Time on Track Rollers

**Problem:** To automatically turn, face and chamfer Track Rollers in one operation.

Solution: The Model R-14 Automatic Lo-swing Lathe was selected for this job due to its rigid construction and its demonstrated fine performance with cemented carbide tools. The Track Rollers, 9-3/4" in diameter and 9-3/8" long, are held and driven from the rough forged bore with a compensating type, six jaw air operated driver. The tailstock, shown in the withdrawn position in the lower illustration, is electrically operated and has a travel of 16" to facilitate loading and unloading of the rollers on the driver. The upper illustration

shows the tooling which consists of six front turning tools, eight heavy rear facing tools, eight small chamfering tools and two chamfering tools for the inside diameter. Note the special cam operated, 45° inside bore chamfering attachment mounted on the headstock of the lathe. Swivel type tool-setting gauges, mounted directly on the tool blocks, reduce tool-setting time. All tools are cemented tungsten carbide operating at cutting speed of 350 ft. per minute. Total floor to floor time for the job is 3.5 minutes each.

Engineered jobs are our specialty, and our staff is at your disposal to assist in solving your turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N.Y.

PRODUCTION COSTS ARE LOWER WITH So-swing

#### You gain both in production and cost-wise with

#### MORRIS

MOR-SPEED

## PRODUCTION MACHINE

● For the past decade the MORRIS Machine Tool Co. has specialized in the design — development — and building of high production drilling machines to meet specific job conditions.

As a result of this long experience and specialization they are in a position to help you solve intricate drilling, boring, facing and tapping problems on mass production work.

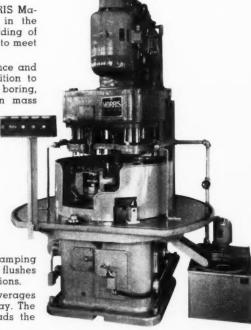
Take the machine illustrated for example:—the job here consisted of drilling, reaming and chamfering steel pump hubs for automotive transmissions.

The answer in this particular instance was the Morris Vertical Hydraulic Six Station Automatic Indexing machine shown. The machine is equipped with a 28 spindle vertical head and six fixtures arranged for double

hand loading with automatic clamping and unclamping. A coolant system flushes the work during machining operations.

Production is continuous and averages over 1700 pieces per eight hour day. The operator merely loads and unloads the work at the loading position.

If you are considering high production work requiring drilling, reaming, tapping or similar operations it will pay you to



consult MORRIS. They have the experience, the engineering "know-how" and facilities to help you.



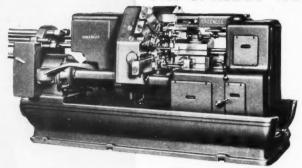


BRANCH WAREHOUSES: NEW YORK . DETROIT . CHICAGO . SAN FRANCISCO

#### RUGGED, COMPACT, EFFICIENT

## GREENLE

SIX-SPINDLE AUTOMATICS



## TS on all kinds

GREENLEE Automatic Screw Machines are rugged, compact, surprisingly simple in operation and maintenance, and unusually versatile. Check these time-saving and cost-cutting features,

#### INTERCHANGEABLE CROSS SLIDE CAMMING

All six cross slide cams can be replaced in less than 6 minutes, and only 15 cams handle 90% of the average job-shop requirements.

#### STANDARDIZED TOOLING SPEEDS SET-UPS

With identically machined tool cavities and interchangeable tool holders, Greenlee Automatics make quick job changes a cinch. You save in equipment costs, too!

#### A SIMPLE ADJUSTMENT SETS THE STROKE

A graduated worm-wheel permits an accurate setting of the tool slide stroke in a simple, easy operation without guesswork, fuss, or bother.

#### A ROOMY TOOLING AREA HELPS OPERATORS

There's plenty of elbow room in the tooling area, making it easy for operators to accurately position tools and attachments for best results.



GET COMPLETE, DETAILED INFOR. 1881 MASON AVE., ROCKFORD, ILL.

DRILLING, BORING, TAPPING MACHINES . SCREW

SETTING TOOL-SLIDE STROKE

CHANGING A CROSS-SLIDE CAM



MACHINES . TRANSFER PROCESSING MACHINES

# Only MARVEL builds all four\*

While it is true there are several builders of hack sawing machines and many builders of band sawing machines and many builders of band sawing machines, only MARVEL builds BOTH hack saws and band saws. The fact is that MARVEL manufactures 35 models of 10 basic types of metal sawing machines which include the world's fastest automatic production saw, the world's largest giant hydraulic hack saws, the world's most versatile band saw and the most widely used small shop saws.

With intimate and broad field experience in all types of metal cutting-off equipment and 35 different saws available, it is obvious that MARVEL Field Engineers occupy a unique and exclusive position in the industry. They are eminently qualified to make expert and un-biased recommendations covering the type, size and model of metal sawing equipment best suited to individual requirements—the most efficient, most accurate, fastest, broadest in scope and the most economical.

MARVEL is also the only manufacturer of both metal sawing machines and metal sawing blades. Because the efficiencies of both the machine and the blades are interdependent, each upon the capability of the other, expert know-ledge covering both saws and saw blades is essential to the proper appraisal of any specific sawing situation. Correct balance of cutting speed and blade life, feed pressure and blade tension are all potent factors in over-all performance. Here again it is the MARVEL Field Engineer who is qualified to provide the comprehensive answer to your question. His job is to help you saw metal most efficiently-his ser\*HACK SAWING MACHINES

\*BAND SAWING MACHINES

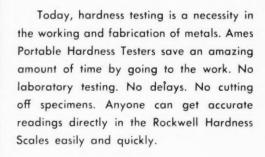
\*BAND SAW BLADES

\*HACK SAW BLADES



# Ames PRECISION HARDNESS TESTERS

FOR ROCKWELL HARDNESS TESTING





For testing round and flat stock, tubing, saws, knives, etc., up to one inch in Rockwell A, B and C Scales. Weighs only  $11_2$  lbs.

#### Model 2 Hardness Tester

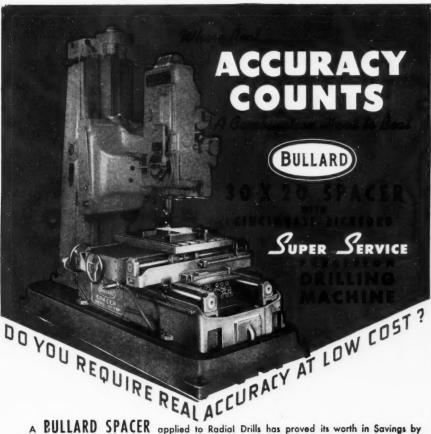
For testing rounds and flats, dies, odd-shaped pieces, etc., up to two inches in Rockwell A, B and C Scales. Two inch throat depth. Weighs 2½ lbs.

#### Model 4 Hardness Tester

For testing up to four inch capacity directly in Rockwell A, B and C Scales. Throat depth two inches. Taken to the work for accurate, on-the-spot tests. Weighs 314 lbs.

Send for descriptive literature.

AMES PRECISION MACHINE WORKS WALTHAM 54, MASS.



A BULLARD SPACER applied to Radial Drills has proved its worth in Savings by eliminating many costly jigs previously required on many drilling operations.

Almost unbelievable operational Savings have also been made.

However, Accuracy is only as good as the accuracy of the Drill to which the Spacer is applied. To assure the Accuracy of which the spacer is capable, Cincinnati Bickford offer their Super Service Precision Drilling Machine.

With a Precision Spindle in the drill, this combination is Hard to beat on reproduced Accuracy of hole spacing, drilling, reaming and tapping.

Installations of this type are proving Profitable investments in numerous plants. Ask Bullard or Cincinnati Bickford about this "Natural" combination.

## BULLARD COMPANY

if it takes you more than 28 minutes to pierce this first panel... . .

#### then you'd better get a **W**

The same short run piercing job took 28 minutes on a Wiedemann R-4P because layout time was completely eliminated. There was no waiting for the die set-up man . . . all punches and dies were carried in the turret of the machine right at the operator's fingertips.

There's a Wiedemann Turret Punch Press that can save you both time and money on every short run piercing operation . . . /chassis, instrument panels, electrical boxes, bus bars, sheet metal parts, and plate up to %" in thickness.



4219 WISSAHICKON AVENUE. PHILADELPHIA 32, PA.

HERE'S THE ACTUAL JOB! Check these production times... typical work of the R-4P.

- rent dies required R-4P Pin Type Gauge
- ★ Time for every subsequent piece . . 9½ mins.

Cast Iron machining dust giving you trouble?

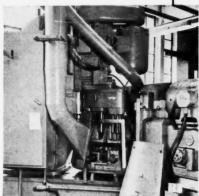
#### IF SO YOU'VE GOT A JOB FOR ROTO-CLONE DUST CONTROL

CAST iron dust has long presented a collection problem. Now, with increased machine tool speeds and the tendency to concentrate a greater number of operations in a given area, there is an ever-increasing demand for a practical solution.

And here's the answer. Scores of companies are using Type D Roto-Clones\* successfully to exhaust and collect fine, floating cast iron dust from their machining operations. Whether it's drilling, reaming, boring, milling, turning or gear cutting, you are assured of positive dust control.

The Type D Roto-Clone is the most widely used dust collector in industry today. Its advantages are many—constant efficiency under all operating conditions, uniform air volume, small space requirements and ease of installation. When desired, a Cycoil Oil Bath After-Cleaner can be added which will provide the necessary cleanliness to permit recirculation of the cleaned air to the workroom.

For complete information on the application of the Type D Roto-Clone to cast iron machining operations, call your local AAF representative or write direct to—



Roto-Clone Dust Control applied to Rebnberg-Jacobson Automatic which mills, drills, counterbores and reams.



Ex-Cello Boring Machine equipped with Roto-Clone Dust Control.

#### AMERICAN AIR FILTER COMPANY, INC.

100 Central Avenue, Louisville 8, Ky.

In Canada: Darling Bros., Ltd., Montreal, P.Q.

\*Roto-Clone is the trademark (Reg. U. S. Pat. Off. Jofthe American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and bydrostatic precipitator types.

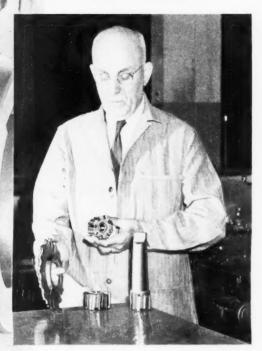
ROTO-CLONE®

DUST CONTROL EQUIPMENT

## INGERSOLL

#### SMALL DIAMETER AND NARROW INSERTED BLADE CUTTERS

- This group of Small Diameter at Narrow Inserted Blade Cutters are used in our own shop. They are typical of this class of milling cutters. While they are more expensive initially than solid cutters, they are money savers in the long run.
- The Ingersoll Solid Shank End Mill at the right, for example, costs \$35.00, while a solid cutter of the same dimensions sells for about \$19.00. Since each set of HSS replacement blades for the Ingersoll cutter costs only \$4.40, your cutter body investment is almost repaid with your first set of replacement blades. After that, you save about \$14.60 with every set—the difference between the cost of blades and the price of a new solid cutter.
- The Ingersoll Staggered Tooth Slotting Cutter at the left costs about \$34.00 more than a solid cutter of the same size, but this additional investment is returned to you with the first set of replacement blades. Starting with the second set of blades, you save about \$35.00 every time you change.
- The Ingersoll Face Mill in the operator's hand costs \$34.00 compared to about \$15.00 for a solid cutter of the same size, but you will break even with the third set of blades, and save nearly \$7.00 with every change after that.
- Ingersoli Small Diameter and Narrow loserted Blade Cutters are available in High Speed Steel or Carbide Tipped Blades.



• For specific information as to how much you can save by using Ingersoll Small Diameter and Nor ow Inserted Blade Cutters, write us, giving the details of your milling and boring operation. If you wish, our representatives will call at your shop to study your operation and recommend cutters for your work.



Mile thorpison transfer designation of exercises

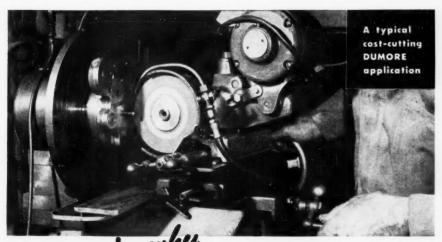


# at the comfort level you can see what you're doing



THOSE WHO BUY GILBERT BUY GILBERT AGAIN

investment. For full information on this machine see Bulletin 349. Write for it today, on your letterhead, please . . . The Cincinnati Gilbert Machine Tool Co., 3366 Beekman Street, Cincinnati 23, Ohio.



## Here's why L. K. Willis says... "We're DUMORE BOOSTERS!"

#### 2 Dumore Grinders do work of \$16,000 worth of special machinery

Willis Refrigeration Service, Long Beach, California, solves the common small-shop problem of handling a wide range of jobs with minimum machine investment by extensive use of Dumore Precision Grinders. Two typical set-ups, utilize a second-hand tap grinder, and (believe it or not) an old meat slicer, cost approximately \$900 . . . eliminate \$16,000 worth of special machinery, save over \$15,000.

#### 6 operations on 1 part cost less than \$1.00 including labor

Using a Series 5 Grinder on a used screw-machine base, Willis performs six operations on a pump for less than \$1.00 including labor — (1) grind indexing position on cylinder block, (2) grind valve

pads, (3) grind valve seats, (4) grind indexing position on valve plate, (5) grind valve plate surface, (6) grind hardened steel disc of discharge valve. They have owned the Series 11 six years, and the Series 5 three years. Willis says, "no maintenance of any consequence . . . work with always-dependable accuracy".

Ask your DUMORE Distributor to show you how DUMORE Grinders can give you high production, .0001" accuracy at a lower tool investment. Call him today, or write The DUMORE COMPANY, Dept. A-33, Racine, Wisconsin.

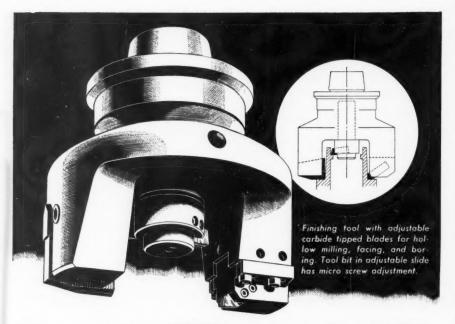


Export address: The DUMORE COMPANY 13 East 40th St., New York 16, N.Y., U.S.A.









#### They cut the METAL ... cut the COSTS

Alarming facts about obsolescence of machine tools have recently been published.

You may or may not be able to replace your obsolete machines. But in either case, remember it's the tools in those machines that cut the metal. They'll cut costs too... if efficiently designed. Quite often it's the tooling that makes the difference between profit and loss. A striking example of how an existing machine was re-tooled for greater pro-

machine was re-tooled for greater productivity is shown here. Designed and built by Gairing, it is one of ten multi-

operation tools made to fit a two-way, four-spindle, roughing and precision boring machine making tractor parts.

The success of this well planned tool set-up resulted in an immediate order for more such up-to-the-minute tooling from the same client.

Gairing's representatives and tool engineers stand ready to see what can be done for you . . . to design and build for your *new* machines or for your *old* . . . the tools that cut the metal, cut the costs. The Gairing Tool Company, Box 478, Detroit 32, Michigan.

Also Manufacturers of:

STANDARD END CUTTING TOOLS

QUICK-CHANGE BLOCK-TYPE BORING TOOLS

E-CON-O-MILL STANDARD FACE MILLS

GAIR-LOCK FINE TOOTH CUTTERS





## STEEL EQUIPMENT

OVER CATALOGED ITEMS, FOR

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Factories: YORK, PA., AURORA, ILL., CHICAGO HEIGHTS, ILL. Warehouses, Branches and Dealers in Principal Cities





#### A PARTIAL LIST OF LYON PRODUCTS

- · Shelving
- tockers Wood Working Benches

- Racks
- Economy Locker

- Kitchen Cabinets
   Display Equipment
   Hanging Cabinets
   Hadding Cabinets
   Welding Benches
   Storage Cabinet
   Welding Benches

- Conveyors
   Shop Boxes
   Bar Racks
- Bin Units

- Service Carts
   Hopper Bins
   Parts Cases
   Flat Drawers

  - Files
- · Tool Trays
- DesksStoolsTool Boxes
  - Sorting Files
     Revolving Bin



#### recision Tolerances Easy

Because it is easy to machine work to the most exacting specifications with South Bend Lathes, they were selected by one of the largest steel manufacturers for use in their research laboratory shown in the illustration above. Here special tools, dies, fixtures and parts are machined to specified dimensions with ease and certainty.

Often the accuracy and quality of finish obtained with South Bend Lathes are such that subsequent grinding, honing, or lapping operations are unnecessary. Equally adaptable to toolroom, manufacturing, or maintenance operations, South Bend Lathes will give you years of satisfactory service for a minimum cost.

**Building Better Tools Since 1906** 

SOUTH LATHI SOUTH BEND, INDIANA



Street



## KNURLED SOCKET HEAD CAP SCREW

There is a definite saving of assembly time when you use "UNBRAKO" Socket Head Cap Screws with Knurled Heads. The exclusive Knurled Heads perform triple duty: (1' the Knurling provides a sure, slip-proof grip; (2) the Knurling speeds assembly, because it enables the "UNBRAKO" to be screwed in faster and further with the fingers—handiest of all wrenches—before a "key" becomes necessary; (3) the Knurling permits positive locking—a feature so often essential where there is excessive impact or vibration.

impact or vibration.

As always, the brand name "UNBRAKO" signifies extra strength and precision manufacture to close tolerances. "UNBRAKO" Knurled Socket Head Cap Screws are available in both National Coarse and National Fine Thread Series in a full range of standard sizes. Other sizes to special order. Write us for your free copy of the "UNBRAKO" Catalog and the name of your nearest "UNBRAKO" Distributor.

#### Other "UNBRAKO" Products Include:

Socket Set Screws with Knurled Cup Points, Socket Set Screws with Knurled Threads, Square Head Set Screws with Knurled Cup Points—all patented Self-Locking screws that won't shake loose! Knurled Socket Head Stripper Bolts • Precision-Ground Dowel Pins • Fully-Formed Pressure Plugs.

Knurling of Socket Screws originated with "Unbrako" in 1934.

SPS

#### STANDARD PRESSED STEEL CO.

BOX556. JENKINTOWN, PENNSYLVANIA

"UNBRAKO Counts with the Men who Count"





The OLIVER HEAVY DUTY ACE CUTTER GRINDER will save you dollars in your tool room operations.

This Oliver Machine is designed for heavy jobs . . . gashing, gumming and finish grinding High Speed Stellite and Tungsten-Carbide Cutters.

The ACE is most versatile. The range of cutting tools accommodated by this machine with a minimum of extra features is exceptional. It offers easy and quick set-up with less operator fatigue . . . work is in full view of operator. A fixed diamond compensates for wheel wear between teeth. In fact, the ACE Cutter Grinder gives you every feature possible to expedite your tool room operations.

A small model ACE Cutter Grinder for lighter work is available (illustrated at the right above).

WRITE FOR COMPLETE INFORMATION

#### OLIVER INSTRUMENT CO.

1430 E. MAUMEE . ADRIAN, MICHIGAN

AUTOMATIC DRILL GRINDERS TOOL & CUTTER CRINDERS—DRILL POINT THINNERS—TEMPLATE TOOL GRINDERS—FACE MILL GRINDERS—DIEMAKING MACHINES

## 15 NEW COST-CUTTERS



THE 15-IN-5 ROTOR CHIPPERS



5 "REGULARS"...5 "SUPER-SPEEDS"...5 "SUPER-SOCKS"

- ALL FROM 5 BASIC MODELS



#### Rotor Tool brings you the biggest step forward in chipping hammers in the past 15 years!

You can give Old Man Cost a blow he'll never forget with the sensational new ROTOR Chipping Hammers!

MORE VERSATILE. You can easily adapt each basic model to serve as 3 hammers to match your job. (1) A "regular" model, (2) A "super-speed" model, (3) A "super-sock" model—because you can switch from one to another by a simple change of parts.

**SHORTER**... easier to get into crowded quarters because of new exclusive "doughnut" valve.

LIGHTER . . . easier to bandle.

FASTER CUTTING because of new exclusive design.

Write for all the facts today!

AIR O'TOOL



ROTOR TOOL

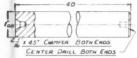


RAISE PRODUCTION and LOWER COSTS. Substitute 1 Machine for 3 or 4! COMBINING OPERATIONS with the MOTCH & MERRYWEATHER (Double End) MACHINE

(1) Chamfers both ends. (2) Center drills both ends. (3) Center drills and chamters both ends. (4) Threads both ends (to a reasonable length). (5) Trepans one or both ends. (6) Turns one or both ends (box tool). (7) Chamters O.D. and I.D. of tubing. (8) Reams one end or both ends of tubing. (9) Chamfers O.D. and reams both ends of tubing.

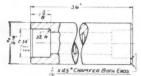
#### MORE THAN A NEW MACHINE-ACTUALLY A NEW METHOD

The Motch & Merryweather "DE" (double end) Transfer Machine has no equivalent, Standard bar stock is automatically fed, cut off with a square milled finish to accurate lengths, and automatically transferred to equalizing, self-centering jaws for accurate double-end machining. You save at least one operator; save several handlings; save overhead and floor space; save tooling. Husky construction makes for trouble-free service and long, profitable life. Illustrated below are six typical transfer" jobs.

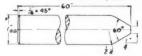


Operation: Cut off, chamfer and center drill both ends. SAE 1040 ground shafting.

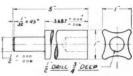
Material: Production: 240 pcs/hr



Operation: Cutoff, bore and chamfer inside and outside, both ends. SAE 1020 tubing. Material: Production: 180 pcs/hr.

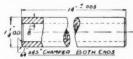


Operation: Cut off, chamfer one end, point opposite end D SAE 1141 C. R. Material: Production 163 pcs/hr



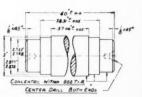
Operation: Cut off, turn one end, drill opposite end

Material: Extruded brass Production: 200 pcs/hr



SAWS STOCK TO ACCURATE LENGTHS

Cut off and chamter Operation both ends 1020 seamless tubing Material Production 342 pcs/br

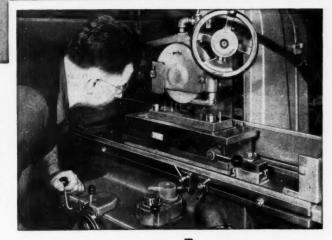


Cut off, box mill, turn and Operation center drill both ends.

Material: **SAE 1020** Production: 140 pcs/hr

I MOTCH & MERRYWEATHER MACHINERY CO. PENTON BUILDING CLEVELAND 13, OHIO

## Enthusiastic Customers do our BEST advertising



Tinnerman Products, Inc. of Cleveland, Ohio, manufacturers of Speed Nuts, use a No. 25 Grand Rapids Hydraulic Feed Surface Grinder in their toolroom. Here their Model 25 is shown grinding a combination die.

You will appreciate the micro-inch finish produced at production speeds on Grand Rapids Grinders. All Grand Rapids Hydraulic Feed Surface Grinders have these outstanding features:

- 1. One-piece column and base casting for vibrationless rigidity
- 2. Precision ball-bearing spindle which is greased for life
- 3. Bijur one-shot lubrication system eliminating hand oiling
- 4. Patented vertical movement of wheel head for quick, accurate adjustments
- 5. Portable coolant tank for ease of coolant replacement
- Vane type hydraulic pump for fast longitudinal table travel

GRAND RAPIDS GRINDERS

to some you-

Your inquiry concerning your specific grinding needs will receive prompt attention. Grand Rapids Grinders include: Hydraulic Feed Surface Grinders, Universal Cutter and Tool Grinders, Hand Feed Surface Grinders, Drill Grinders, Tap Grinders, and Combination Tap and Drill Grinders.



308 Straight, S. W., Grand Rapids 4, Mich.



#### BACKSTAND-BELT GRINDING INCREASES PRODUCTION IN POLISHING AND FINISHING

The coated abrasive belt used in conjunction with contact wheel today is established as an efficient production tool. For grinding, polishing and finishing hundreds of consumer and industrial items, the backstand-belt method today has been proved much more efficient and economical than has the old set-up wheel method.

Five Advantages

Manufacturers who have switched from the set-up wheel method point to five distinct advantages of the backstand-belt method over the set-up wheel . . .

• An abrasive belt is a scientifically made tool, manufactured under controlled atmosphere conditions by experts utilizing modern making equipment. The photomicrographs compare the crude, uncontrollable rolled-on cutting surface of typical set-up wheel (A) with the coating on an Armour Abrasive Belt (B). Note how the sharp cutting points on the factory-coated belt are exposed to provide faster, cleaner cutting action—increased production.





R

#### Need Coated Abrasives? Call Armour!

Backstand belts are only one item in Armour's complete line of coated abrasives. Alundum, Garalun, Garnet and Crystolon come in rolls of paper, cloth or combination . . . in sheets for hand sanding in belts, discs, and other specialized forms.

Whatever your products or specialized needs . . . one of Armour's complete line of metal-working abrasives is *right* for you.

We recommend buying through your Industrial Distributor.



Coated Abrasives

Armour and Company North Benton Road, Alliance, Ohio

- The coated abrasive belt cuts cooler because of the longer interval between work contacts.
- Inexperienced help can be quickly trained to operate a backstand-belt machine. Skilled personnel needed to dress set-up wheels can be used elsewhere.
- It takes only a few seconds to change an abrasive belt.
- The temperature-controlled room used for curing set-up wheels can be released for other more productive uses.

#### **Actual Case History**

The W. L. and Metals Company used a hard, set-up polishing wheel on aluminum sand castings for aircraft and transportation industries. The wheels had to be inspected constantly for out-of roundness.

When the company changed to the backstand-belt method, removing gates and fins from castings was no longer a drawback to production. With this new method abrasive costs were lower and the finish much better. The entire operation was speeded up 50-60%.

It will pay you to investigate the modern backstand-belt method. Write today to the Coated Abrasives Division, Armour and Company, North Benton Road, Alliance, Ohio, for the booklet — "Facts about Backstand-Belt Grinding and Polishing."



"STEEL BARS?

402,

I'LL DELIVER AT ONCE"

IMMEDIATE DELIVERY is a "must" for the Union Drawn Distributor – the shapes and sizes wanted – a bar at a time or a truckload. Why? • Because his stock acts as production supply line for many a successful plant and shop in your area – and his failure would be their failure. • Because of volume, turnover, diversification and control . . . gaps just don't happen in HIS stockpile. • In addition to unfreezing your dollars buried in your own stock, you reduce "down-time" to a minimum when you hitch your production line to his stockpile. • Ask for his stocklist and

get under way today!



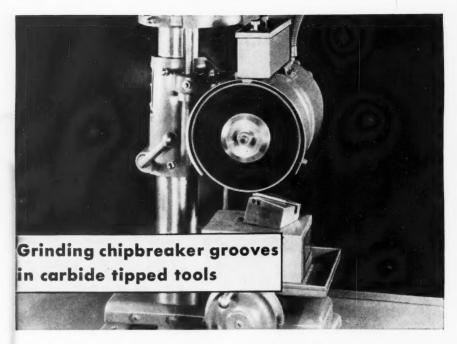




PHONE YOUR UNION DRAWN DISTRIBUTOR

Today.

COLD DRAWN STEELS



#### with MANHATTAN DIAMOND WHEELS

Exclusive Manhattan bonding also permits the grinding of soft or hardened steel shanks in conjunction with grinding carbide inserts without loading or glazing.

Unexcelled for precision grinding of Carbides on surface, cylindrical or internal operations.

NO DRESSING

GREATER ECONOMY

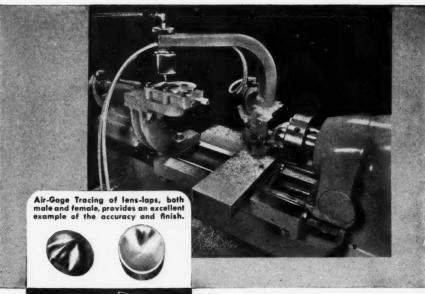
DIAMOND WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION - PASSAIC, NEW JERSEY



#### RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings • Asbestos Lextiles • Powdered Metal Products • Abrasive & Diamond Wheels • Bowling Balls





## All the Advantages of AIR-GAGE TRACING Available for SMALL, HIGH-SPEED WORK

• Here's a new Monarch high-speed contour turning team to push your costs way down.

The proved advantages of Air-Gage Tracing now are available on the famous Monarch high-speed 10" EE Precision Manufacturing Lathe.

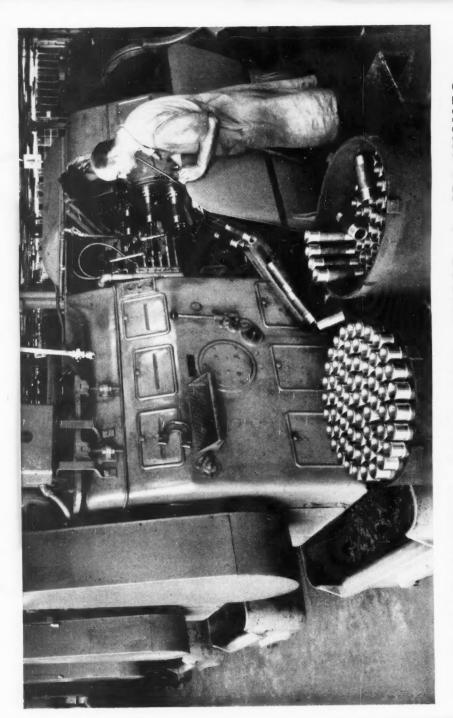
By the exclusive Air-Gage Tracing method you can turn step shafts; turn, bore and face contours of innumerable kinds. This is done in a fraction of the usual machining time, at

a fraction of normal costs—and with better accuracy and finish. Let us supply you with complete details.

THE MONARCH MACHINE TOOL CO., Sidney, Ohio

A GOOD TURN FASTER - TURN TO MONARCH

TURNING MACHINES



MAINTENANCE COST FOR THESE 4 MACHINES:

# FOR 25,913 HOURS' CONTINUOUS PRODUCTION! LESS THAN 2% PER HOUR

Here's a battery of four machines that has been continuously operating for 25,913 hours, producing a total of 1,215,853 pieces—and at an over-all maintenance cost of only \$683.40. That figure covers both labor and materials.

In other words, maintenance averaged only \$170.85 per machine. And bear in mind, this remarkable record was made on heavy duty work—the kind that puts a machine to severe test for stamina and sustained accuracy.

Acme-Gridley Automatics are built with basic design advantages for such low-cost performance: The rigid, box-type frame resists vibration, holds precision on heavy cuts. Positive, direct, quick-change camming eliminates the need for adjustments to take up wear in loose-connected linkages. It will pay you to investigate Acme-Gridley Automatics when you want the most in metal turning—more good pieces in the pan—with minimum maintenance. May we give you more information?



## JOB FACTS

Part: Track Link Bushing.

Size: 258" Diam. x 8" long; 7½ lbs. Material: Steel Tubing.

Machine: Acme-Gridley 25%" RB-8 Spindle Automatic Bar Machine.

Performance: Battery of 4 machines operating continuously for 25,913 hours.

Production: 1,215,853 pieces.

Maintenance Charges: \$683.40 total (including labor and materials).

# The NATIONAL ACME CO.

CLEVELAND 8, OHIO 170 EAST 131st STREET .

Acme-Gridley 4-6 and 8 Spindle Bar and Automatics - Single Spindle Machines - Automatics - Thread Rolling Taps - The Chronolog - Limit, Motor Starter Centriluges - Contract Manufacturing

#### Var Keuren WIRE TYPE PLUG GAGES





AGD 11/4" GAGE

#### WHICH GAGE WILL YOU BUY?



#### CATALOG AND HANDBOOK No. 34

This 208 page volume represents 2 years of research sponsored by the Van Keuren Co.

It presents for the first time in history a simple and exact method of measuring screws and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

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also the Brightboy Catalog-Manual. Write the Brightboy Service Department on any production or methods problems where finishing is involved.



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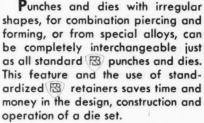
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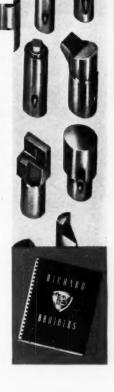


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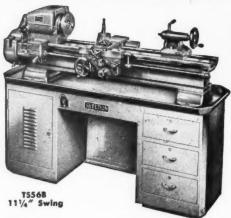
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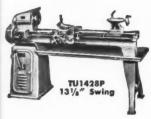
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## A lathe is too big when:



- When it is too large and complex for any but the most experienced to operate safely.
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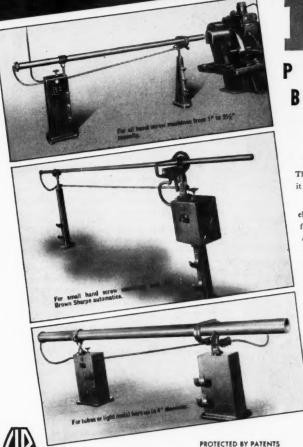
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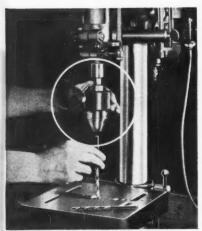
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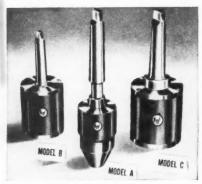
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#### Change drills in a second, safely with this Automatic Chuck while spindle is running



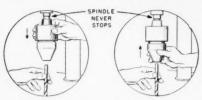
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#### THESE WAHLSTROM TOOLS CUT COSTS, TOO



Wahlstrom Chucks are available in several size ranges: Model A=1/32" to 1/2"; Model AA=1/64" to 3/8". Model B=15/64" to 1/2"; 3/8" to 3/4"; 17/32" to 1". Model C=Holds any size tool with No. 1, 2, or 3 M. T. Shank.

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Grip sleeve—pull down
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2. Insert new drill-push up tapered part-drill is locked in place.

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DRILL CHUCKS



56



COMBINATION Box and Open Head combines the best features of the Engineers' and the 15° Box wrenches in one wrench. Both ends have the same size opening.

45° ANGLE BOX in both the long and short pattern, with thin sidewalls, openings chamfered for quick location over bolts and correctly proportioned handles in all sizes.

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Case History at AMPCO

To obtain definite physical properties that meet strict specifications, this large propeller blade is heat treated at a predetermined temperature and held for the proper number of hours to produce desired results.

## Multi-Range

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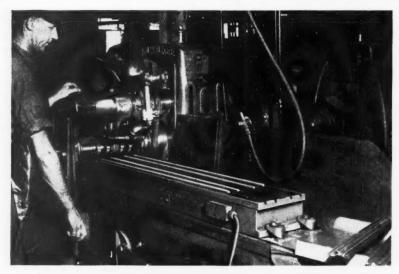
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That's What Production

That's What Remington Rand Did With MAGNA-LOCK Magnetic Chucks



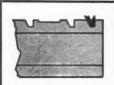
JOB-mill clearance cut and 90° "V" cut on Carriage Rail Lower Race.

FORMER METHOD — climb milling (2 machines) two set-ups and two manually operated fixtures for each machine.

70 pieces per hour Production Cost \$0.0241 each Rejects .... Total Scrap

PRESENT METHOD - climb milling (2 machines) one set-up and one MAGNA-LOCK SUPREME 10" x 48" Magnetic Chuck\* for each machine. Production 200 pieces per hour Cost \$0,00812 each .. None Rejects Total Scrap 0.2 of 1%

#### \*PAID FOR BOTH CHUCKS IN 57 WORKING DAYS



Cross - section of chuck showing recessed top plate with work piece in position.

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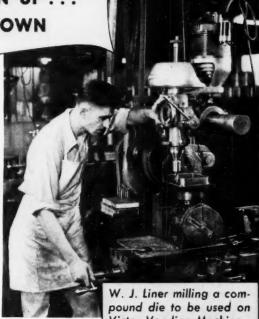
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	10													80"	
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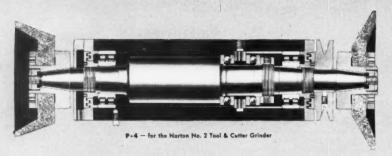
#### BUTTERFIELD THE 100% INSPECTED TOOLS

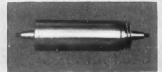
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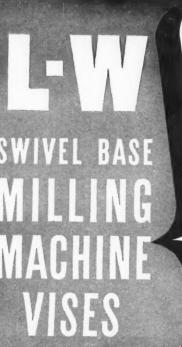
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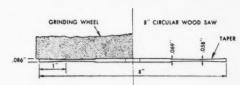
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GRINDS CIRCULAR WOOD SAWS

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Grinders

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Photograph shows operators cutting % plate and 20 gage sheet steel simultaneously on NIAGARA Power Squaring Shear. No change in knife adjustment is necessary.

The ability of Niagara Power Squaring Shears to cut thick and thin plate both at the same time with the same knife setting is a dramatic demonstration.

Visitors at our plant can see this done every day.

There is no necessity for tinkering with the knife adjustment

# Demonstrates The Sound Engineering Design of Page 1997 POWER SQUARING SHEARS

 There is no compromise with sound, proven engineering when it comes to NIAGARA shear design and construction.

Accurate cutting depends primarily on rigidity of the shear's components, For bed, crosshead and holddown NIAGARA uses CLOSED BOX SECTIONS to resist with minimum deflection the horizontal, vertical and diagonal or torsional loads to which every shear is subjected.

NO OTHER SECTION WILL DO THIS JOB AS EFFICIENTLY.

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The economy of quality is remembered long after price is forgotten.





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TOOL HOLDERS . . . for every operation!

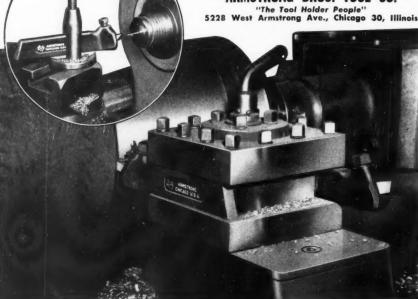
There are ARMSTRONG TOOL HOLDERS in sizes and types for every operation on lathes, planers, slotters and shapers—for the heaviest cuts; for the most delicate cuts.

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These permanent multi-purpose tools can be picked up as needed from your industrial distributor. Use them wherever possible to increase number of pieces per hour, to lower cost per pieces.

Write for our new S-48 Catalog.

### ARMSTRONG BROS. TOOL CO.





# Machine Shop

JANUARY, 1950

Vol. 22, No. 8

#### Two Men with A Plan

By Fred W. Vogel

TURE

SS

П

This is the story of a plan of operation intended primarily as a stop-gap measure to maintain profitable operations during a period of uncertain business conditions but which continues to function today as an outstanding example of cooperative effort. Page 76.

### Bearing Retention by Swaging

By Gilbert C. Close

Gil Close describes a swaging process recently developed by a Northrop Aircraft engineer which has proved to be especially valuable for use with bearings which are operated under positive thrust loads. Page 88.

### **Hydraulic Housekeeping**

By Spencer Jones

This article emphasizes that a well defined program of hydraulic system maintenance is essential to the satisfactory and continuous operation of hydraulically operated machine tools. Hydraulic systems of several machine tools are illustrated in color. Page 100.

### **Shop Notes on Heat Treating of Steels**

By W. B. Cooley

This is the first of two articles in which the author directs his remarks primarily to the shop man who may be unfamiliar with heat treating practice in general or with the use of an electric furnace. Page 118.

### **Producing Good Work in Inexpensive Dies**

By C. W. Hinman

In response to many requests for information on low-cost dies, Mr. Hinman deviates from his current series on shaving and burnishing dies to offer several excellent inexpensive methods which may be used to obtain first-class work. Page 130.

#### Sales Hints for the Smaller Shop

By Karl F. Kirchhofer

Mr. Kirchhofer offers some practical advice for the man who has the desire to start his own metal-working shop. Page 142.

#### Mechanizing Quality Control

By Clifford W. Kennedy

In this article author Kennedy describes several systems of mechanized quality control, the most important of which are the "banding" of indicators and the "two out of three" systems. Page 150.

### Measuring the Mouth Diameters of Tapered Holes

By W. M. Halliday

Mr. Halliday describes various currently available measuring methods and then presents a simple gage which is designed as an all-purpose measuring instrument to provide for the precision measurement of tapered holes of widely different diameters. Page 170.

# Two Men With a Plan

### Employees at Market Specialties Are in Business for Themselves

By FRED W. VOGEL

OCATED in the heart of eastern Cleveland's great industrial section is a small one-story brick building that houses Market Specialties Company. In appearance, the building resembles any one of the hundreds of jobbing machine shops which one may find in almost every industrial section of the country. Its interior, too, with its layout of machine tools which are designed to perform an endless variety of basic machining operations and the signs of bustling activity is similar to many other jobbing shops. The similarity to other shops of the jobbing variety ends, however, when you begin to analyze the unique plan under which this shop is operated. At Market Specialties many of the men in the shop are

in business for themselves.

To fully understand the formation and operation of this shop in which many of the workers own the machines at which they work it is necessary to go back more than two years to the time when its co-owners George Zerby and Edward Ranney were faced with many problems. Materials and labor costs had risen to a point where profitable operation of the business was almost impossible.

With a shop partly full of machines and only Zerby and Ranney available to solicit new business as well as to search for new sources of scarce materials it became apparent to those two men that continuance in business meant obtaining additional help and additional capital. When hope had almost vanished, they hit upon the plan of offering other skilled machinists the opportunity to either purchase one of the machines already in the shop or to buy one on the market and have it installed in the shop.

Tom Horvath, a machinist with some 30-odd years' experience on screw machines, was the first to take advantage of the plan offered by Zerby and Ranney. In March 1947, he purchased a secondhand Warner & Swasey No. 3 turret lathe for \$2,000 from George Whalley Company, machine and tool dealers of Cleveland, and had the machine moved to the Market Specialties shop.

About the same time, Robert Haye, who with a small amount of machine shop experience and with a tidy sum which he had wisely put aside for the time that he could invest in a business venture of his own, decided that the Zerby and Ranney proposition offered unlimited possibilities. So he, like Horvath, bought a machine. In his case, however, Haye purchased for the

sum of \$1500 a
Reed-Prentice 16inch x 4-foot engine lathe which
was already in
the shop and owned by Zerby and
Ranney.

These are but two examples of a number of men who have joined Zerby and Ranney in their attempt to prove that cooperative effort—which is still possible in our type of economy—can succeed.

Each new applicant is carefully screened by Zerby and Ranney and by other owner-operators. Requirements are character, operating ability, and equipment that will not conflict with machines already installed. If the applicant passes, other members of the firm vote him into their company-wide operating agreement.

With a nucleus of a half-dozen men or so Zerby and Ranney made contacts for business. In the beginning firms such as Skidmore Gear. Chase Brass, Bryant Heater and others of like caliber began sending work orders to be processed at Market Specialties. These companies found that through the cooperative effort of the jobbing shop, their work was being processed more rapidly than it had ever been before. The secret of high production lay in the man at the machine who, with pride of ownership and self-assurance, now possessed the initiative to turn out more and better work.

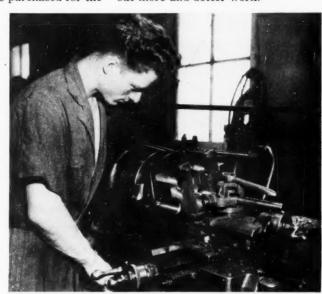


Fig. 1 — Illustration showing Robert Haye boring taper in pointer die block.

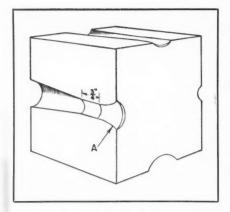


Fig. 2-Sketch of pointer die block.

Although Zerby and Ranney made the initial contacts for work contracts because of their wide acquaintance with the field, many orders followed in which a member of the shop on whose machine the work was to be done was called in for consultation. This has led to a situation whereby a manufacturer may contact the machine operator directly to quote on a job. In several instances, the operator himself, having

information to the effect that a particular job was available has gone directly to the manufacturer and quoted on the job. In other words, the individual machine owner may act on his own in order to secure new business if the occasion arises.

Some of the jobs which come into the shop require a number of operations, thus the operator of a screw machine, lathe, and shaper may be called upon to quote jointly on a particular job. In instances of this nature each owner goes over the "prints", determines the part of the job which can be performed on his machine, estimates the length of time which will be required, and then submits a bid. All the bids are then combined, and to this is added a predetermined overhead charge in order to arrive at the quotation for the job. If the job requires an operation which can be performed on several similar machines, then each owner of the similar machines is requested to submit a quotation and the average of the various quotations will be the one which appears on the quotation for the customer. Thus, payments to machine owners are made on

> the basis of the bid each entered for the job, with a deduction to cover heat, light, water, rent and other incidental expenses.

One of the interesting jobs among the many which Market Specialties has

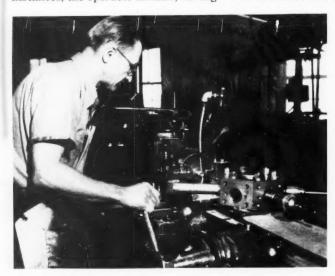
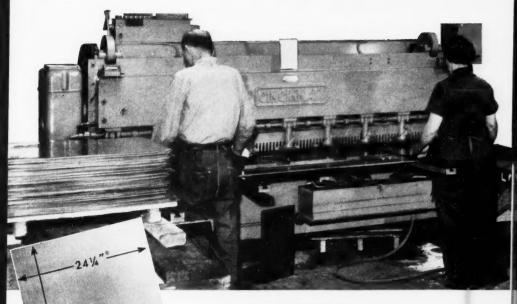


Fig. 3 — Illustration showing Tom Horvath operating turret lathe in the machining of Hi-Tensile cast - iron gears.



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Fig. 4 — Edward E. Ranney and George A. Zerby check finished workpiece with prints.

been called upon to perform is that of machining pointer die blocks which are used in the drawing of brass bar stock. A complete pointer die consists of four blocks. On four sides of each block half round holes of various diameters are machined which correspond with half round holes in one of the other blocks. Thus, with a complete set of four blocks, a total of 8 diameters are provided with the sizes of the holes ranging from 19/32-inch diameter up to 21/2-inch diameter. In use, two blocks that provide the desired diameter hole are clamped together and a bar of brass of large diameter drawn through the hole which is of smaller diameter than that of the stock.

The job of machining the blocks was turned over to Robert Haye who is shown in Fig. 1 performing one of the required machining operations. Initially, the blocks are sawed from 5¾-inch square, bar, die stock. Two blocks are then clamped together side by side in a special fixture which is mounted on the headstock of the Reed-Prentice lathe shown in Fig. 1. The desired diameter hole is then drilled at a point midway along the line formed by the

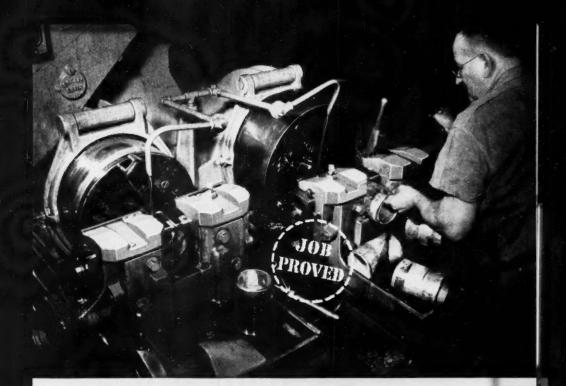
two adjoining blocks, thus providing upon completion of the drilling operation one half of a hole in each block. Boring of the hole follows.

The boring tool is held in the lathe tool post and hand fed into the work to generate a bell-mouth taper as shown at A in the sketch Fig. 2. The

tool is reset for boring a ¾-inch length of the straight drilled section. The tool is again reset and a 4 degree relief angle taper is bored from the end of the straight section out to the ends of the blocks.

In pointing down brass bar stock, a bar of brass is fed into the bell-mouth taper, forced by means of reciprocating action into the straight section of the blocks. Obviously, the boring of the long taper is a blind operation requiring the use of a special type boring bar as well as unusual skill on the part of the operator. Prior to the development of a special boring bar by Robert Haye, the bell-mouth taper and the straight section were bored after which the blocks were turned end for end in the fixture in order to bore the long taper. With the development of the special tool, a considerable amount of time has been saved in the boring operation. The relief taper cutting speed is approximately 212 revolutions per minute.

Figure 3 shows a view of Tom Horvath machining a Hi-Tensile cast-iron gear blank which when finished will be mounted on the distributor drive shaft for driving both the distributor and oil



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pump of a well-known make of automobile. The finish dimensions call for gear diameter 1.134 inch, gear face width  $\frac{6}{16} \pm 0.005$  inch, hole size 0.498 inch, hub outside diameter 0.810 inch, and hub length  $1\frac{1}{6}$  inch. The hole, gear face and gear o.d. must be held concentric and parallel to within 0.001 inch total indicator reading. The number of gears turned out by Horvath during an 8-hour day varies between 160 and 170.

The Market Specialties Group have found that their arrangement has paid off in productivity and efficiency. More orders can be filled and the workmanship is better. After a job has been accepted by one of the workers in the shop practically no supervision is required. Final inspection of each job is usually performed by either Zerby or Ranney, and in some cases by both, as shown in Fig. 4. Here they are shown checking dimensions of a steering knuckle for a motorized industrial truck with the prints. Thorough final inspection of each job completed in the

shop is the best guarantee of customer satisfaction. That many customers have been satisfied with the work produced at Market Specialties is evident from the increasing number of repeat orders.

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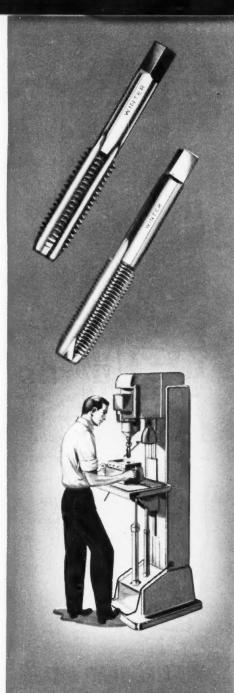
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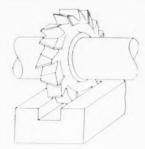
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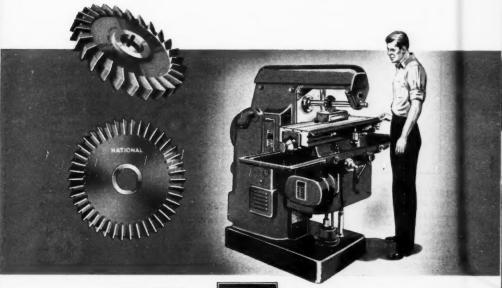
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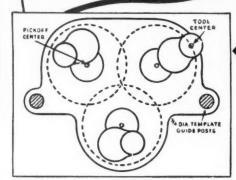
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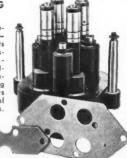




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# Bearing Retention By Swaging

Roller-type swaging tool developed at Northrop during investigation of swaging methods.

By GILBERT C. CLOSE

A NEW swaging process for bearing retention, along with all necessary tool specifications and design at a has been announced by T. E. iper, Chief Process Engineer of orthrop Aircraft, Inc., Hawthorne, alifornia. The new process has supereded nearly all other methods of bearing "staking" in the Northrop shops, and it has proved to be especially aluable for use with bearings which are operated under positive thrust bads.

Essentially, the process consists of nachining a groove in a hearing housng, and then swaging the lip of the roove over onto a bearing chamfer. A liagrammatic sketch of the process may be seen in Fig. 1. The process has been standardized for standard materials used in the plant, and design data have been tabulated for these different materials, as shown in Table I.

Prior to the adoption of the swaging process, investigations were carried out in order to discover a more reliable means of bearing retention than that provided by conventional staking methods. Snap-ring and screw-ring methods of retention were not considered, and substitution of the swaging process for either of these methods would depend largely on economy and production advantages that might accrue in specific cases.

During the course of the investigations, a number of tests were run using various swaging procedures. Press swaging, which is illustrated in Fig. 2. was found to be satisfactory for the softer wrought alloys and medium steels; but when this method was used for less ductile alloys such as 75S aluminum, FS-1 magesium, and the harder cast steels, there was a tendency for the swaged rings to crack. Friction spin swaging, Fig. 3, was also tried; but with the harder alloys there was a tendency for the spinning tool to be cut despite the fact that it was tempered of Rockwell C-61.

Northrop engineers point out that the methods of press swaging and fric-

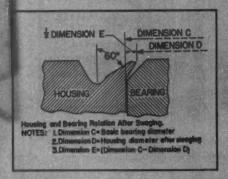


Fig. 1—Sketch showing swaging method of bearing retention.

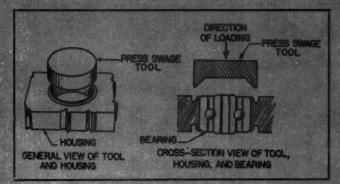


Fig. 2 — lilustration showing press swaging arrangement.

tion spin swaging would no doubt be satisfactory for bearing retention with certain alloys; however, for their purposes, the method of swaging with a roller-type tool, Fig. 4, produced the most promising results, and subsequent investigational efforts were channeled toward the perfection of this process.

From the preliminary tests of spin swaging it was concluded that:

- (1) The tool face angle necessary for optimum swaging results was critical.
- (2) The limits for depth and width of ring were critical,
- (3) A roller-type swaging to ol would be necessary in production in order to produce satisfactory results.
- (4) A machined ring tapered from top to root was necessary so that a greater root cross-section and consequently a greater resistance to axial load could be obtained without affecting the ease of swaging,
- (5) The push-out load obtained must be sufficiently high to allow use of the method for retaining all bearings subject to misalignment or vibrational axial loads.

With these design, production, and operational requirements in mind, a subsequent series of tests was made

varying the tool face angle in the range of from 45 to 70 deg. to the housing bore axia. At an angle of 4 deg., the proble of cracking of the

ring due to bending stresses was escountered with the less ductile materials such as 75ST aluminum and FS-magnesium. At 70 deg., insufficier clearance of the tool was encountere on some types and diameters of bearings. Therefore, 60 deg. to the houring bore axis was determined to be the optimum tool face angle for swaging

The machined ring was tapered from top to bottom on some test speciment

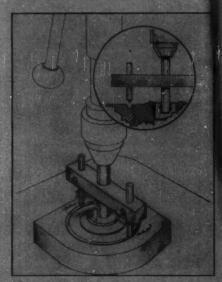


Fig. 3—Sketch showing friction spin method of swaging.

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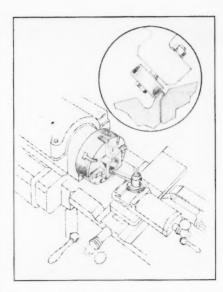
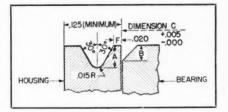


Fig. 4—Method of swaging with a roller-type tool was the method found to be most satisfactory.

and parallel sided rings were used for other specimens. It was found that the optimum ring shape was that having a taper from top to root of 30 deg. to the housing bore axis. Cracking due to bending occurred for the less ductile materials when parallel sided rings were used.

Having determined these factors, further tests were conducted in order to determine the optimum thickness of the ring, dimension F, Fig. 5; the depth of the groove, dimension A, Fig. 5; and

Fig. 5—Drawing giving design details of roll swaging method.



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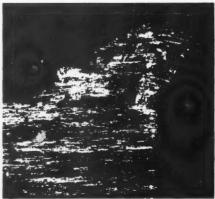


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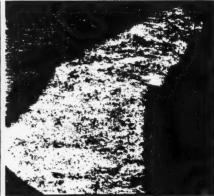


Fig. 6—Representative photomicrographs. At the left is shown a typical roll swaged structure for permanent bearing installation (35 X). At the right is shown a typical shear defect that occurs with extreme swaging (35 X).

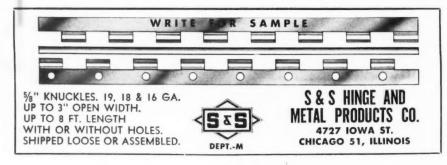
the amount of swaging, dimension E, Fig. 1. It was discovered that satisfactory results could be obtained with dimension F between 0.015 and 0.040 inch, and therefore 0.020 +.005 -.000 was established as a standard.

The maximum depth of groove, dimension A, Fig. 5, which gave consistently satisfactory results from a metallurgical standpoint was 0.050 inch, and this was established as a standard. It was found that the amount of swaging, dimension E. Fig. 1, could be increased progressively to 0.050 inch without cracking of the ring but that over 0.050 inch, cracking occurred in the brittle alloys. Therefore, the

maximum value of dimension E was set at 0.030 inch, allowing a considerable margin of safety in preventing cracking.

Using these standardized dimensions and tolerances, a series of tests was then run in order to establish pushout load factors. Several specimens each of SAE 4130 steel (165,000 p.s.i.), SAE 4340 steel (200,000 p.s.i.), 356-T6 sand cast aluminum, H-HT sand cast magnesium, 75ST-T6 aluminum, and FS-lh magnesium were roll-swaged over bearings which varied in diameter from 0.70 to 3.50 inches.

The bearings were then loaded axially to failure, and failure loads of the swaged rings were recorded. In addi-





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tion, a series of identical tests were run on 75ST-T6 aluminum roll-swaged housings in order to determine the variation in failure loads which might occur. On the basis of these tests it

I, and dimensions for design and fabrication definitely established as shown in Figs. 1 and 5. During the investigations complete metallurgical examinations were made of the effects pro-

### TABLE I—DESIGN DATA FOR ROLL SWAGING PROCESS (See Figures 1 and 5)

MATERIAL	Dimension A Groove Depth	Dimension B Chamfer Depth	Reswaging Permissible Dimension   Load/Inch		Permanently Installed	
			Dimension E (1)	(2)	Dimension E (1)	Load/Inch (2)
Aluminum (75S-T6)	.045 +.005 000	.060 —.035	.010 ±.002	220	.025 —.000 +.005	550
	.025 +.005 000	.034 or less	.007 ±.002	210	.015 —.000 +.005	450
Magnesium (FS-lh)	.045 (3)	.060 —.035	.010 (3)	82	.025 (3)	205
	.025 (3)	.034 or less			.015 (3)	165
Steel (6)	.045 (3)	.060 —.035	.010 (3)	325	.025 (3)	810
	.025 (3)	.034 or less	.010 (3)	435	.015 (3)	650
Aluminum Casting (356-T6)	.045 (3)	.060 —.035			.025 (3)	
	.025 (3)	.034 or less			.015 (3)	
Magnesium Casting (H-HT)	.045 (3)	.060 —.035	.010 (3)	110	.025 (3)	275
	.025 (3)	.034 or less			.015 (3)	
Steel Casting (SAE 4130)	.045 (3)	.060 —.035			.025 (3)	
	.025 (3)	.034 or less			.015 (3)	

NOTES: (1) For Dimension E, see Figure 1.

(2) The load listed above refers to the load per inch of housing circumference and therefore is applicable to all diameters.

Tolerances for all materials are the same as for 75S-T6 aluminum.

For Dimensions A and B, see Figure 5. SAE 4130 (165-185,000 psi) SAE 4140 (185-200,000 psi) SAE 4340 (200-220,000 psi)

was determined that a safe design load for roll-swaged bearings would be

Failure Load Design Load= 1.5

It should be noted that in designing for the roll-swage process, the manufacturer's rated thrust load for any bearing must be taken into consideration. The design load, then, must be for the lower of the two figures.

After evaluation of all tests, design data was compiled as shown in Table duced by roll swaging. Fig. 6 shows two typical photomicrographs which were made.

The roll swage method of bearing retention may be readily adapted to production. Tests made at the Northrop plant were all conducted on standard lathes or milling machines with test tools. The positions of the tool, tool holder, and work holder, which are shown in Fig. 7, indicate one production method which may be used on a

vertical or a horizontal milling machine for producing acceptable swaged parts. With a proper means of controlling axial tool penetration, a similar method could be used on a heavy duty, low speed drill press.

The set up shown in Fig. 7 requires only one tool and tool holder in order to include all diameters of bearings. A single work holder will serve also for all diameters of bearings. However, for

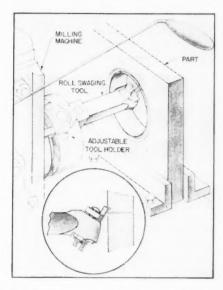


Fig. 7—Illustration showing roll swaging set up on a horizontal milling machine.

each different bearing internal diameter, a separate locating device is needed in order to position the bearing and housing in the work holding fixture.

"Drill Holes 0.002 Inch in Diameter Economically" is the title of a four-page two-color bulletin (No. 752) published by the Taylor Dynamometer & Machine Co., 5108 W. Center St., Milwaukee 10, Wis., which presents illustrations, descriptions, and specifications on sensitive drilling machines, both bench and floor types, with capacities to %-inch diameter.

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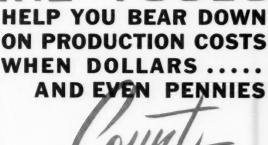
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# Hydraulic Housekeeping

### Practical suggestions on the proper care of hydraulic systems.

By Spencer Jones

IT may be said that most of the trouble which is encountered with hydraulic equipment is due to sloppy housekeeping. The trouble is seldom due to faulty design of hydraulic circuits or to the type of hydraulic oil which is used. These facts may seem like kindergarten comments to experienced users of hydraulic equipment, but once in a while it is a good thing for us to remind ourselves of facts which we know but sometimes forget to put into practice.

The bane of a housekeeper at home is just plain dirt, and it is a similar just plain dirt that causes too many troubles in hydraulic systems. A thoroughly unscientific definition of dirt in oil could be given as, "anything undesirable in the oil that was not there when it was bought—and anything undesirable in the system that was not there when it was first put into operation."

Dirt may consist of many things particles of the materials on which a

machine tool is working, foundry sand, cutting or grinding liquids, gums, sludges, bits of packing, water, air, rust, dust, corrosives, or combinations of these. It is possible for some dirt to be strained or filtered out of a system;

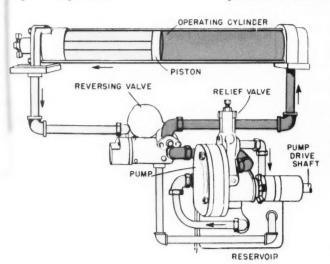


Diagram showing essential parts of an hydraulic system.

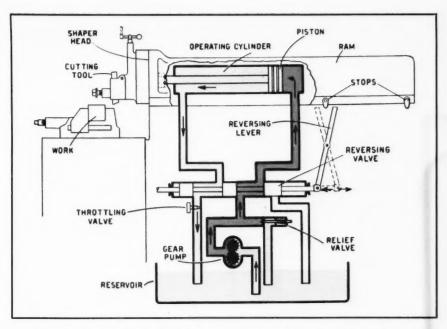


Diagram showing principal parts of a constant-volume hydraulic circuit of a shaper.

some sinks to the bottom of a tank or reservoir; some is carried in solution or rendered comparatively harmless by the hydraulic oil—and the rest of it may cause trouble.

The ideal situation would be to keep the oil and everything it touches absolutely clean. However, this is an impossibility unless the hydraulic system and machine tool are not used at all; and therefore if production is desired (and when is it not?), the practical thing to do is to keep the system as clean as possible under operating conditions in order to minimize hydraulic troubles.

The hydraulic circuit of a machine tool used in production is going to pick up or create within itself a certain amount of dirt regardless of the amount of care which is taken. Hydraulic housekeeping thus becomes a job of keeping this amount of dirt

down to a minimum. Like some domestic housekeepers, those in charge of hydraulically operated or controlled machine tools often wait for dirt to accumulate and for troubles to start happening before they start to do any hydraulic housekeeping. A better method is to use preventive hydraulic housekeeping, and it is this method which really pays off in troublefree operation.

Among the best trained of all preventive hydraulic housekeepers are the graduates of the Henry Ford Trade School of Dearborn, Michigan. The fact that hydraulic circuits on machine tools in Ford Motor Company plants cause so few interruptions to production is no doubt a direct reflection upon the fine training which is given in the school, and the fact that the men in the shop understand the basic hydraulic principles. It would be well for others

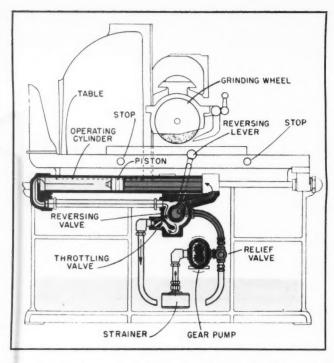


Diagram showing constant-volume hydraulic system of a surface grinder.

being emptied.

After the reservoir has been filled, the control valve is placed in a neutral position. The electrical control switch is worked on and off several times: and petcocks are opened in order to permit air to escape and then closed when "solid" oil emerges. Thus the system is filled with oil and purged of air without allowing the pump to reach full speed.

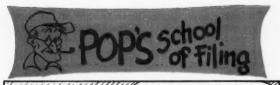
After the system is filled, the oil level in the pump reservoir is checked again in order to make certain that the proper amount of oil is present.

After providing for a proper amount of clean oil in a clean system, the next step in preventive hydraulic housekeeping is to keep the oil and the system reasonably clean. Air cleaners are placed in the breather openings if the air in the shop is at all dusty. Abrasive dust particles which enter the reservoir through the breather may create excessive wear in the moving parts of the hydraulic equipment; and this, in turn, may necessitate premature replacements. Air cleaners should be of a type which may be removed easily for cleaning, and this cleaning should be done at frequent and regular intervals.

to learn the lessons which these men have learned.

Students at the school are taught to make certain that reservoirs, piping, fittings, pumps, and all other parts of a hydraulic circuit are as clean and free from dirt, scale, grit, waste, and lint as is possible within practical limits. This factor of cleanliness is applied to all hydraulic equipment, new or old, and at all times—during operation, following repairs, or prior to filling, refilling, or replenishing with oil.

Standard tank filling instructions which are given are to "use a very fine mesh strainer or cheese cloth" and pour the oil into the given tank or reservoir slowly. These instructions apply even to oil which is poured from sealed containers since drops of solder or bits of lint have been known to be disgorged while such containers were





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It is taken for granted that oil filters are installed on hydraulic equipment in order to take out the greater part of any fine foreign matter that may be present in the oil. It is also assumed that there is a strainer or screen over the suction end of the inlet pipe in order to take out larger chunks that may be suspended in the reservoir oil. Specific examples of foreign matter which is and must be removed are as follows: dirt and chips from operating machines, filings from tubing, pieces of steel from threaded fittings, cast iron particles from hydraulic cylinders. threads from rags used to clean out the reservoir, and chips of paint.

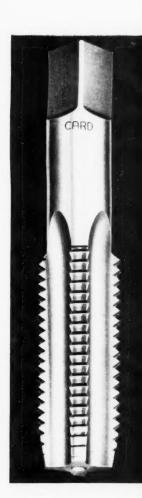
The bits of foreign matter which are caught by a screen or filter usually stay there, and they gradually build up resistance to the flow of oil. A neglected screen or filter will eventually clog up and cause cavitation (the noisy implosion of vacuum bubbles inside the pump), erratic feed rate, loss of pres-

sure, or complete failure of the pump to circulate oil. By applying preventive hydraulic housekeeping, oil is examined, drained, and removed if necessary at frequent and regular intervals; and similarly, screens and filters are removed, cleaned, and replaced.

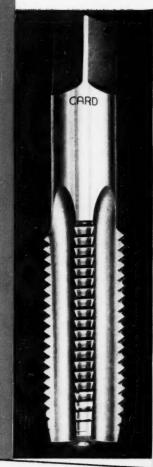
The question now arises, "What is meant by frequent and regular intervals?" New installations are drained immediately after the first week of operation. This means the complete hydraulic system—piping, pump, cylinders, motors, and reservoir; and it also includes examination and cleaning of air cleaners and oil screens and filters, with renewal of elements if necessary. The oil tank or reservoir is also wiped out with clean, dry towels—never with waste. The hydraulic oil is inspected, and if it is found to be in good condition, it is re-used.

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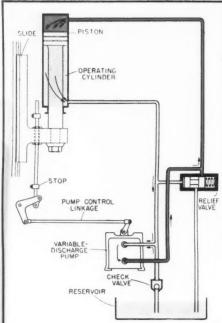
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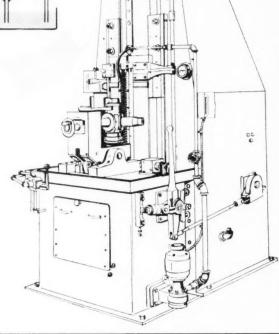
Simplified diagram of a variable-volume hydraulic system of a vertical broaching machine.

ed and the system is examined and cleaned, regardless of the appearance of the oil.

After the intermediate and scheduled drainings, the system is flushed; neither kerosene nor gasoline is ever used for the flushing, nor is any oil used other than that which is specified for normal operation of

spection are either two, four, or six months. depending upon the nature of service of the machine. In addition, the oil is examined approximately every two weeks, and if it appears to be dangerously dirty, it is changed; and the entire system is examined and cleaned. When the scheduled oil change time arrives, the oil is drain-







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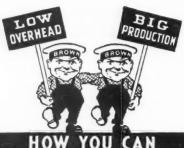
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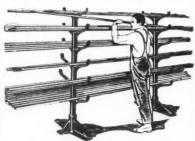
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the circuit. This is done to make certain that the necessary lubrication of the pumping and control system will be maintained. It is believed that the use of flushing liquids other than the specified hydraulic oil may tend to adulterate the oil and lessen its ability to lubricate properly. This prohibition applies, even after six months of operation between drains. The theory maintained is that if the specified oil is kept clean within practical limits, there will not be any need for a gumsolvent or rust-inhibiting liquid flush. Hydraulic oil which is used for flushing is never used subsequently in a machine on production unless it has been reclaimed and purified.

There are, of course, several excellent flushing liquids for hydraulic systems, some of which exert valuable gum-solvent and rust-inhibiting actions. These liquids are used in many shops with complete satisfaction; and, as a matter of fact, they are often considered to be necessary. But it is nevertheless true that none of these flushing liquids has any great lubricating value, and that their use should always be followed by a thorough flushing with hydraulic oil. The hydraulic oil used for this flushing should not then be reused in a production machine until it has been purified, although it may be used in an "as is" condition for two or three subsequent flushings.

Extreme care should be taken to prevent any dirt or grit from entering a system while repair work is being done or adjustments made, or when gaging the contents of the reservoir. Except when it is absolutely necessary to use them, all holes or openings must remain covered in order to keep out chips or foreign matter from any source.

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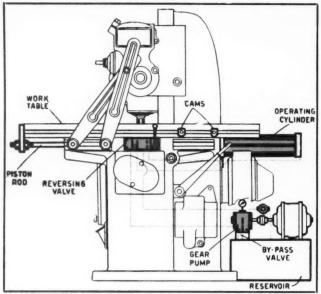
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Simplified diagram of an hydraulic system of a milling machine.

As for correc-

tions for these

conditions, the in-

take pipe is kept below the surface of the oil in the

reservoir by simply adding more oil; air bubbles in the reservoir oil should all be released before the oil returned to the reservoir has passed the baffle (use an oil that de-foams fast); and since air may points of a system is not in use, it is wise ocks and check the air a pump is noisy, and that there is enough

collect in the high points of a system when a machine is not in use, it is wise to open the petcocks and check the air drain valves. If a pump is noisy, and if it is certain that there is enough "solid" oil in the reservoir and that the high points of the system are filled with "solid" oil, it is suggested that the joints of the intake line be flooded with oil while the pump is running. Should the noise stop when a certain joint is flooded, the location of the air leak is revealed, and the condition is eliminated by tightening that joint. Insufficient pressure is sometimes caused by air bubbles reaching the relief valve. and erratic feed may be caused by the "cushioning" effect of air bubbles in the oil.

Practically speaking, a certain amount of air will always enter an hydraulic system; however, if air cleaners are used, and if the system is filled properly with a good grade of oil, most of the dirt will be caught by the air cleaner, the entrained or vaporous

than a common occurrence, can cause trouble, it is a good practice to keep any kind of air out of the oil—at least as much as is practically possible. Air is kept out of an hydraulic system by installing and using petcocks or automatic air drain valves in the highest points of the pipe lines. It is also advisable to check the joints of the inlet end of the system where it is possible for air to be sucked in if the fittings are not tight.

Some indications of air in the oil include noisy pumps, insufficient pressure, and erratic feed. In order to check these conditions, the workman should make certain that the intake pipe is well below the surface of the oil, that no air bubbles remain entrained in the oil in the reservoir (be sure that the oil releases air rapidly), that "solid" oil comes out of the petcocks in the high points of the piping when the pump is running, that air drain valves are operating properly, and that there are no leaks in the inlet line.



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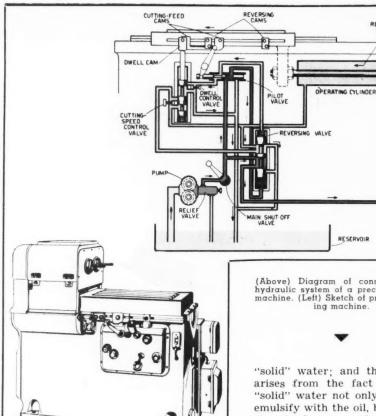
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(Above) Diagram of constant-volume hydraulic system of a precision boring machine. (Left) Sketch of precision boring machine.

RESERVOIR

RETURN

water will not emulsify appreciably, and the oil entering the pump through a tight intake pipe will not contain enough air to cause any harm or to make any noise in the pump. With a reasonable amount of preventive hydraulic housekeeping, air and the dirt and water it carries will cause few hydraulic system troubles.

"Solid" water is another frequent and preventable cause of hydraulic trouble. Cutting and grinding liquids serve as the commonest sources for the

"solid" water; and the trouble arises from the fact that the "solid" water not only tends to emulsify with the oil, but it also almost always carries with it abrasive dirt and other contaminants. Emulsified oil tends to lose its lubricating properties to

a large extent; abrasive dirt wears out pump parts and control and other valves, and it makes such valves bind and stick: the other contaminants are likely to create both gum and sludge and thus also make pump parts and valves stick.

There is not much which can be done about worn parts except to remove them and replace them. Both gum and sludge may be cleaned off of sticking pump vanes and valves, but it is a better idea to keep the oil clean in the



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first place. The amount of time devoted to finding out how such damaging "solid" water enters a system, and to closing all entrances, will prove to be time well spent. It will be found that the most common points of entry are tanks and reservoirs having unprotected openings into which cutting and grinding liquids may splash or drip.

On occasion, hydraulic oil will overheat, and this results in poor lubrication or pressure drops. Due to poor lubrication, excessive wear of moving parts is permitted; and, in turn, excessive leaking is caused by worn moving parts. The combination of abrasive dirt in the oil plus poor lubrication is one which is almost sure to create excessive variable leakage, the result of which is likely to be overheated oil accompanied by pressure drops.

It is an unsafe practice to attempt to raise the pressure by tightening either pump control springs or the relief valve spring; higher pressure will cause still higher oil temperature. It

is a much wiser idea to find the cause for the pressure drop. Some of the causes of pressure drops with overheated oil include (in addition to worn moving parts, especially in the pump) leaking of the high pressure relief valve, clogged pipe lines, operating the pump at a higher-than-recommended pressure, overlong maintenance pressure, having a reservoir which is not large enough to permit proper cooling of oil, improper positioning of the control valve, faulty or dull cutting tools, or misalignment or too-tight a ram. Clean oil seldom overheats.

While it is frequently recommended in literature on hydraulic oils and sys-







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tems that the oil be examined at frequent and regular intervals, one cannot tell much about an oil just by looking at it, except to note that it may or may not appear dirty. The following are considered to be better methods to obtain a true picture of the oil condition: feel around the bottom of the reservoir on both sides of the baffle for evidence of grit or sludge; look at the strainer on the intake pipe; examine the air cleaner and oil filter; listen to the pump; check the smoothness of the feed; and take the temperature of the oil in the reservoir. These are more reliable measures than merely using visual examination of the oil.

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# Shop Notes on Heat Treating of Steels

Compiled from a thorough study of electric furnace practice.

Prepared by W. B. Cooley\*

C UCCESSFUL heat treating may be accomplished quite readily with electric furnaces if practical equipment is used, if correct steels are selected for the products, and if established procedures are followed faithfully. A knowledge of metallurgy is not absolutely essential in order to perform heat treating operations although the knowledge is certainly desirable. Steel analyses and heat treating procedures are well establishd so that the required results may be obtained, and automatically controlled electric furnaces are available in order to supply correct and accurate temperature and heating conditions.

The following information, therefore, is presented in a practical way, devoid of metallurgical technicalities; and it is directed primarily to the shop man who may be unfamiliar with heat treating practice in general or with the use of an electric furnace.

A typical small electric furnace installation consists of a furnace proper, a controlling pyrometer (to hold automatically the furnace temperature at a desired set point), a fused line safety switch (usually furnished by the customer), and a two-compartment quenching tank (one compartment

used to hold quenching oil and the other to hold water or brine). The tank is usually mounted on casters so that it may be easily moved to any desired position. A completely wired control panel with automatic multi-breaker line switch and pyrometer is sometimes furnished. The installation is ready for operation after two line wires are connected to the panel and a connector plug is joined.

An electric furnace is particularly suitable for heat treating operations because of its simplicity of operation and the ease with which an unskilled operator may secure consistently excellent results. By using such a furnace, the art of heat treating is reduced to a controllable process.

The only procedure that is required in order to place an electric furnace in operation is that of setting the pyrometer at the desired operating temperature and closing the line switch. The furnace is then energized, and the temperature is increased until the setting of the pyrometer is reached, after which the power is cut on and off automatically in order to hold the furnace at the desired temperature. When work having a widely varying cross section is to be heated, it is sometimes desirable to heat the piece more slowly than usual in order to equalize the heat in

<sup>\*</sup>President, Cooley Electric Mfg. Co.

the part. The rate of heating may be controlled by manually setting a power modifier and limiting the power to the furnace in any desired proportion of from 5 to 100 per cent of full rating. This close control of rate of heating is also useful in cases where low temperatures are to be used, as in tempering.

Parts which may be heat treated in an electric furnace may be classified broadly into two groups—(1) tools and dies, and (2) production parts. The heat treatment of tools and dies will be discussed more thoroughly in this article since the data on this subject may be applied, generally, to production heat treating, and since the life and use of a tool or die depends so largely upon its heat treatment.

#### Definitions

At this point it would be well to define some of the terms which are used in this discussion.

Critical Temperature. When a steel is heated, there is a certain temperature, varying with the analysis, at which the carbon in the steel is combined in solution with the iron. This temperature is called the lower "critical" temperature and is the important temperature upon which all procedures in steel treating are based.

Hardening. This is the process of heating steel to a point above its "critical" temperature and then cooling with sufficient speed to develop hardness. Steels are cooled (quenched) in either air, oil, water, or brine. The heating temperature and the quenching medium are specified by the steel supplier. The actual hardness does not develop until the temperature of the steel has been reduced below 500 deg. F. whereupon the hardness increases until the temperature of the steel has approached room temperature.

Tempering (drawing). When a steel is quenched, a drastic rate of cooling



may set up internal strains which might cause breakage of the given part when it is in use. In order to overcome these strains, a tempering treatment may be applied. The hardened steel is re-heated to a temperature which is lower than the lower "critical" temperature and which is specified by the steel supplier, and then held at that temperature for an extended period of time. This operation tends to toughen the steel and cause some decrease in hardness; however, the benefits of extended tool life more than offset the undesirable reduction in hardness.

Normalizing (returning steel to normal conditions). When a tool is improperly hardened, or when a forging is to be heat treated, the steel in either case may be brought back to a normal or pre-transformed state by being heated to a temperature which is well above the "critical" and being slowly cooled in air.

Annealing. The process of softening steel by heating to a temperature which is slightly above the "critical" and then cooling very slowly is called annealing. Annealing is used in cases where good machinability is required and the steel to be used is too hard to be machined either after forging or hardening. Annealing may also be used to remove strains which may be developed in the steel by machining or hardening.

Types of Tool Steels. Tool steels may be classified broadly by the method of quenching used—water (or brine), oil, or air hardening or quenching steels. Since high speed steel is not included in this discussion, reference to it is made only as a separate type of tool steel.

Each type of tool steel has its own merits, and the selection of the type to be used for a given tool depends largely upon the use to which the tool is to be put. Sometimes the matter of



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GRINDING CO. 6605 Cedar Ave., Phone: EN 3412, CLEVELAND 3.0 the cost of either process or material is a factor which influences the selection. The various types of steels are made available by steel manufacturers so that a proper selection may be made in order to provide the best and most economical material for a given part.

By far the most widely used type of tool steel is a standard carbon steel of the water quenching type. This type of tool steel provides the three main requirements of a good tool steeltoughness, hardness, and wearing ability, combined with the economic factor of low initial cost and the factor of ease of heat treatment. These properties may be obtained in these steels to a degree which is satisfactory for many applications. In cases where unusual requirements must be met in any or all of these properties, it is suggested that alloy steels, oil quenching, and air hardening be used.

Tool steel manufacturers are well qualified to make recommendations concerning the specific steel to be used for a given job, but it is well for all jobs to be scrutinized carefully in order to determine whether water quenching steel may not be used satisfactorily. The following suggestions on applications are quite broad and should be used only as a general guide.

(1) Water quenching steel has a greater tendency to crack in hardening than does steel of the oil quenching type; therefore, if the tool design is such that cracking tendencies are suspected, oil quenching should be used. Water quenching steels are generally used for blacksmith tools; beading tools: burnishing, cold heading, and caulking tools; lathe centers; collets, impact tools; cutter for slow-cutting service such as pipe cutters; dies (check service required); drift pins; dowels: drills: fixtures; hammers; knives; mandrels; pins; punches; reamers; taps; wrenches; and so on.

(2) Oil quenching steels usually are desirable in cases where there is a tendency for the parts to become warped.



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Where close dimensions are to be held and grinding is not permissible or possible, oil quenching steels are preferable to water quenching steels. Tools generally made of oil quenching steels include arbors, broaches, bushings, cams, chuck jaws, collets, cutters, dies, fixtures, gages, hubs, molds, punches, reamers, rolls, spindles, stamps, taps, and so on.

(3) Air hardening steels are used in cases where the parts have strong tendencies to warp or where unusual requirements must be met. Some tools made from air quenching steels include broaches, dies, hubs, mandrels, punches, rolls, shanks, shear blades, and the like.

It is to be noted that many of the above applications overlap from one type of steel to another. The service required of a part governs the selection of the steel to be used, and careful analysis of service requirements really pays off.

Having selected the type of steel to be used for a given tool, consideration must next be given to the design of the tool. (Actually these two steps go hand in hand.) Often the heat treating equipment or the steel, or both, are blamed as being responsible for service failures when, actually, proper analysis would reveal that the tool was designed without due consideration of its response to heat treatment.

Failure of a steel, which is usually by cracking, occurs as a result of internal strains set up during manufacture, or during heat treating, or from external forces which are imposed in actual use. Usually, the external forces are held well within the specified limits if internal strains are kept to a minimum. Therefore, it is more important to consider the cause and cure of internal strains.

Internal strains develop largely during a quench because of the different temperatures which are present within



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the steel part. These temperature variations are mainly due to large differences in size and shape of the various sections of the workpiece. It is apparent, therefore, that the designer should try to design the piece so that all sections will cool as uniformly as possible. Of course, it is almost impossible to design a tool that could attain perfection in cooling uniformly. These several points should be watched, however - avoid large and small sections adjoining, but where such sections must be used together, eliminate sharp corners; use holes wherever possible in order to lighten heavy sections; and where cutouts unbalance the mass of a piece, cut out counterbalance sections if possible. The use of oil or air hardening steels is often substituted for water quenching steels when cracking tendencies are present.

(Editor's Note: Typical heat treating procedure and tips on better heat treating will be discussed in the next issue.)



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STREET



# Producing Good Work in Inexpensive Dies

C. W. Hinmon

The first of two articles in which the author offers suggestions on the design of low-cost dies.

By C. W. HINMAN Designing Engineer

IT is quite evident that attention is being focused more and more upon cost-cutting methods. For example, the A.S.T.E. meeting which will be held during the week of April 10 in Philadelphia is featuring "Cost Cutting" as the theme of the Industrial Exposition held in conjunction with

the meeting. In recognition of this effort to focus attention upon cost-cutting methods, we have prepared two articles on the subject of designing low-priced press tools. The first of these two articles is presented herewith and covers dies which are used in the production of small precision work

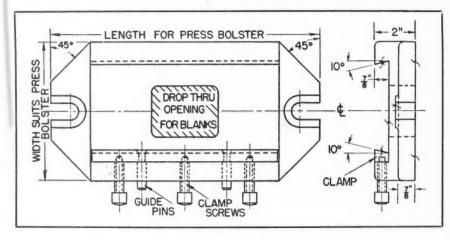
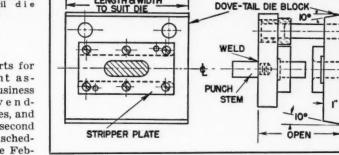


Fig. 1—Illustration showing design of adjustable die holder.

Fig. 2 — Illustration showing application of a dovetail die block.



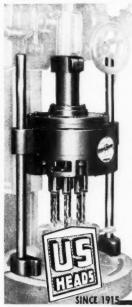
ENGTH & WIDTH

such as parts for instrument assemblies, business machines, ven ding machines, and so on. The second article, scheduled for the February issue, will

cover the design of dies which are used for the production of parts used in large assemblies where precision work is unnecessary, such as for agricultural machinery, automobile body parts, earth moving equipment, and so on.

When working on the design of a blanking die that will be scrapped after

being used to produce only a few thousand parts, several cost-saving factors should be kept in mind. As in the design of first-class dies, the low-cost die should embody first-class workmanship and materials, but because of small production requirements should employ plain punch and die holders without guide posts and



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bushings, plain flat pin stops, and die blocks of 1/2 inch or less in thickness, depending upon output requirements. Cutting members should be within sizes of plus or minus 0.005 inch and the die blocks should have 3/4 to 1 degree clearance taper. Stripper plates are unnecessary for the reason that scrap neck cutters may be used to sever the neck between blanks for feeding ahead. The blanking punch and perforator should be short, and set in a machine-steel plate on the punch holder, or held in place with set-screws or other inexpensive means such as Cerromatrix Metal.\*

The blanks which are produced in the low-cost die should have fairly smooth edges. The general appearance of the die is unimportant, and refinements are unnecessary. Machine finishing of the die is required only where a close fit must be made.

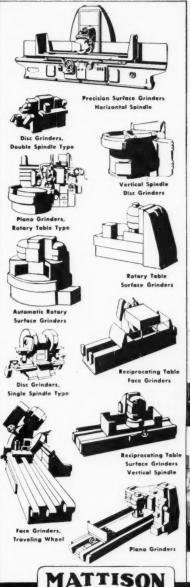
Dies which are built in accordance with these suggestions will cost 60 per cent less than the so-called first-class dies, and will produce workpieces that are practically as good as those produced in first-class dies. If burrs appear on the edges of the blanks, the blanks may be "tumbled" to remove the burrs and rough edges. If a certain portion of the blanks must be held within precision tolerance, a number of blanks may be stacked in a milling machine vise for simultaneously milling them to the required precision measurement. Precision milling is often required even when the blanks are cut in first-class dies.

#### **Dovetail Die Blocks**

Inexpensive dovetail die blocks are frequently specified for use with small dies because of the advantage of low tool cost. Fig. 1 shows an application of an adjustable die holder which is of

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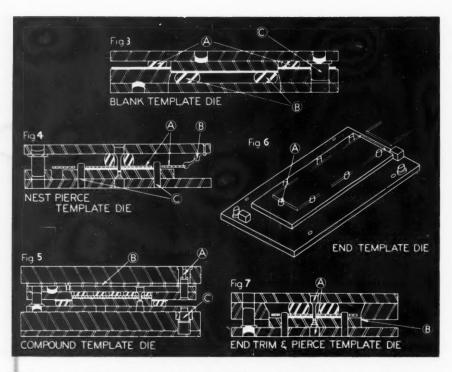


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MACHINE WORKS



Illustrations showing application of the "template" method in building inexpensive dies.
(Illustration courtesy Algoma Products Company)

universal design. The die holder is cast of semi-steel and is machine finished only on the few surfaces indicated by **f.** When inexpensive and efficient press tool equipment is desired, this die holder together with its corresponding die,

shown in Fig. 2, is a very satisfactory design. For even less expensive equipment, the guide posts and guide bushings may be omitted from the die. Only a few different sizes of die holders of this type are required to accommodate

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many different widths, lengths, and types of dies.

An inspection of the simple sketches shown reveals that it is obviously a simple procedure to set up these dies in a press. The die holder is permanently fastened to the press bolster plate in readiness to take any type of die which has dovetailed edges. After clamping the die block in the holder, the latter may be adjusted slightly in order to connect the punch stem centrally under the press ram.

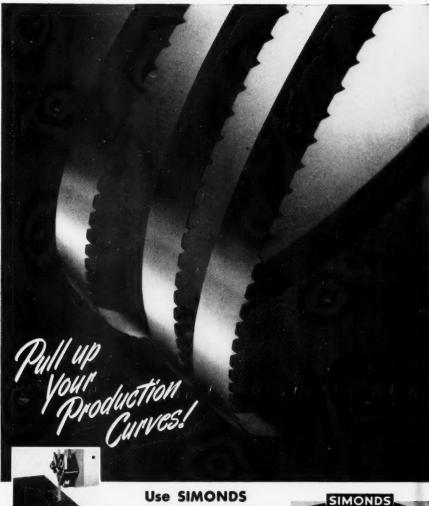
In operation, the die is fed in the same manner as a conventional die set and all other conditions are practically the same even though no regular die set is used. The quality of the work produced in dies mounted on dovetailed blocks compares favorably with that of any other type of die used in any other press.

The dovetailed die block system is especially desirable for use by small manufacturers since it reduces by a considerable amount the usual high cost involved in small-lot orders. The press tool is of light weight and is easy to construct and handle. Ordinarily, only three widths of dovetail-shaped toolsteel die block sections will be required for each press size. The several cross-section widths are machine finished in two or three foot lengths on a planer and then stocked. The stockkeeper may easily cut off any desired length for making a new die block. Dovetailed die blocks require only a minimum amount of storage space. Actually, only about one-half of the tool vault space is required as compared with the space required for dies mounted in conventional die sets.

#### **Template Dies**

Figures 3, 4, 5, 6, 7, and 8 illustrate a new low-priced system for constructing all types of dies. The idea for this system was developed recently by Algoma Products Company. This die





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HACK SAW BLADES

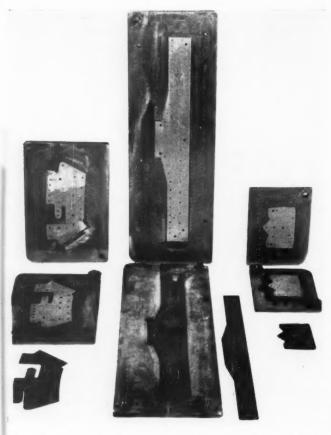


Fig. 8 — Reproduced photograph showing three blanks beside their respective template dies.

(Illustration courtesy Algoma Products Company)

simple scheme of press tool construction, the problem of subsequent alterations in dies due to engineer's changes is practically solved.

The die opening contour is "band sawed" through a die block of chrome molybdenum steel, filed, sheared to size by using the punch, then hardened, and assembled by welding on inexpensive backing-up plates. Thus,

about one-third of the critical alloy steels, formerly required in all conventional dies, are eliminated. Replaceable piercing punches, of hard drawn tool steel, may be used for piercing any reasonable number of small holes in the work.

Blocks of soft rubber for stripping are employed as shown at **A** in Fig. 3. Other soft rubber blocks as at **B**, are used for ejecting blanks from the die. Alignment guide pins **C** of different diameters are used to prevent incorrect assembly of the die plates.

At A in Fig. 4, a thin aluminum plate is employed to equalize the stripping pressure; it is equipped with the at-

making process can be used in blanking, perforating, piercing, and forming hundreds of different parts in any press room. Compared with conventional methods, this process has reduced die costs in many cases about 65 per cent and the time for assembling and trying out the completed press tool, about 75 per cent.

In this "template die method" the dies are built from templates of the workpiece itself. Obviously, this procedure eliminates the need for a special die design, the necessity for tool drawings, and the slow expensive machining operations usually employed to fabricate the die parts. By means of this



Theirs is the responsibility of producing stampings quickly and cheaply with a minimum of delay. They are doing it successfully with DICKERMAN DIE FEEDS... these sturdy feeds increase production and decrease cost. Profit by their experience and install DICKERMAN DIE FEEDS on your own presses... they'll pay for themselves in a surprisingly short time. H. E. Dickerman Manufacturing Co., Springfield, Mass.

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Write Today for full Details tached chain supports shown at **B**. Inserted work-holding pins are provided as shown at **C**.

In Fig. 5, guide cap-screws are provided as shown at **A**. Spring supported pins at **C** permit slugs to be blown off when the die opens. **A** separate plate **B** is employed for backing up the punches in larger dies.

The stop pin A in Fig. 6 is used for gauging when making an end cut. The work strip is guided between six pins,

three on each side.

Piercing is performed in the compound end trimming die shown in Fig. 7 by simply inserting piercing punches A in the punch plate, and by providing corresponding die holes underneath them. Punches A are surrounded by a soft rubber block which strips off the work sheet on the up-stroke. This type of die is designed to handle either strip or sheet stock.

The complete die assembly can be installed in a commercial die set, or on

a press bolster plate that will provide the proper shut height for the die. Two mounting holes in each back-up plate are held to fixed locations with vertical pins in the die shoes. Thus, any of the dies may be interchanged and used in any one of the die sets.

The dies may be designed as single, compound, or progressive type, and are suitable for blanking, piercing forming, or light draws. For progressive dies, the work strip is guided between a nest of removable gauge pins which are inserted in the die face, as

shown in Fig. 6.

Figure 8 is a reproduced photograph in which three different blanks are shown beside their respective template dies. These typical light gauge perforated blanks are just a few of the hundreds of different shapes of small parts that are now being fabricated in

the template type of die.

It is not always economical to attempt tooling and running your own lots of small orders for blanks. There are a score of reliable specialists in this field who are well prepared with special die setups and many years of experience in this line of work. These companies should be given an opportunity to quote prices for making a hundred or several hundred blanks. perforated and formed. Send them your prints of the work, and gauges or specifications as to tolerances. Addresses of some of these specialists will be found in the advertising pages of MODERN MACHINE SHOP.

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# Sales Hints for the Smaller Shop

Karl F. Kirchhofer

## Practical suggestions for the man who wants to start his own metal-working shop.

By KARL F. KIRCHHOFER

PREVIOUS articles in this series on the subject of sales hints have dealt largely with the problems which concern the already-established, smaller metal-working plant. This month, let us cite a few case histories of how and why shop executives who are connected with large, highly successful, and well-known plants happen to go into business for themselves, and what they do to achieve success entirely on their own.

There are few individuals indeed who do not secretly nurture within themselves the dream of, "a business of my own"; and there are fewer of them who thoroughly understand the pitfalls and the difficulties which they will encounter before they are firmly launched on the highway of success. The following are a few sales hints for the man who wants to start his own small metal-working shop.

Not long ago, a highly skilled technician was employed in the service and repair department of a well-known company whose products are used in the aviation and instrument industries. His job was that of dynamically balancing high speed rotors in aircraft. During the course of reconditioning a

directional gyro rotor, the man thought again and again of how much less he could afford to charge for the job if he could perform the work on his own time, in his own shop, and without the enormous overhead which automatically had to be figured into every job that was turned out in the large organization.

In his spare time he built much of the equipment which is required for dynamic balancing jobs, and with his savings he purchased other machines and tools. He then approached the management of the company for which he worked with his plan. They offered no objection to his program, and a few weeks later he was in business for himself. He made personal calls on key men of the leading airline companies, and soon he was established in a small shop out in the country with two employees and all of the business that he could handle. With the aid of a creative printer, he brought out a four page folder explaining his service and stating that, "the tendency toward higher speeds in practically all industries concerned with rotary parts demands increased perfection in dynamic balancing."

Now here is a highly specialized business concerned with supersensitive dynamic balancing that has succeeded, thus far in a modest way, because there was a NEED and a DEMAND and a MARKET for this type of service, and because the specialist could turn out the work at a price which was considerably less than the cost to the airline companies of having the work done in their own plants. Backed by various types of publicity, trade journal advertising, direct mail, and other tools of industrial marketing, the future of this man's business appears to be assured; and thus another man who has "gone into business for himself" is on his way.

Another example may be seen in the case of an expert Swiss-type automatic screw machine set-up man and operator who was working for a watch manufacturer. He bought two automatic screw machines on credit and then canvassed, in his own area, all known users of precision parts which were

produced on automatics. He soon had more than enough work for his two machines; and today, just a few years later, he operates a shop specializing in small precision parts which are used for fountain pens, instruments, and a variety of products.

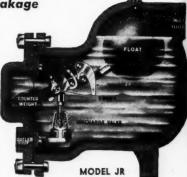
In order to show how numerous the opportunities are for going into business for yourself, it might be interesting to note that one of the employees at the plant producing precision parts soon branched out for himself by installing two automatics in the basement of his home; and there, because of lack of overhead, he is able to compete with practically anyone in the field. In still another instance, the plant superintendent of a well-known manufacturing concern, who had many years of experience in the making of intricate dies, opened a small shop with only a few machine tools. He now makes parts, dies, tools, and fixtures, many for the plant with which he was formerly connected, at a lower cost to

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The discharge valve of Nicholson weightoperated air traps is unaffected by dirt and scale because of the large orifice and the nature of the operating mechanism. Thus tight closure and prevention of blow - through is assured. A positive water-seal at valve is another Nicholson leak-proofing feature. Three types, press. to 1500 lbs., for aftercoolers, separators, etc. For details, CATALOG 448.



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the manufacturers and at a profit to himself.

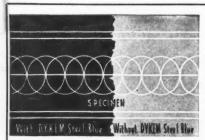
There are many important factors to be considered before going into business in a small way for yourself. Is there a need, and is there a market for your product and/or service? Have you a sufficient number of personal contacts among plant officials who will give you opportunities of quoting on work? Are you adequately financed so that you can operate for a considerable period of time on a modest amount of business and on a comparatively small income. Have you the experience and know-how, the technical and the engineering background, and the intimate knowledge of machine tools and what they will do, that are required? Are you willing and able to put in many more hours on the job than are now necessary in the secure position, built up by years of seniority with your company, that you now enjoy?

Remember that when you leave a job of works manager, chief inspector, plant superintendent, or toolroom foreman in order to venture out on your own, you are frequently burning your bridges behind you. Once you sever your connections, you seldom have an opportunity of picking up the pieces again. For while you are out trying to succeed on your own, the company for which you worked has replaced you, perhaps with a younger man and one who will do the job as well as you did and for less money.

It takes courage, self-confidence,

wide experience, and knowledge to abandon the security of a known weekly pay check for the uncertain profits of your own business and for, very likely, no take-home pay for weeks on end. But America has always been known as the land of opportunity; and as long as there are hard-working, hard-saving toolmakers and machinists who have ideas and imagination, you will still find hundreds of them opening new businesses or taking over unsuccessful ones, each of these men with the strong belief and conviction that he will succeed.

Needless to say, the rewards of running a successful business of your own are numerous-independence, a good living, no fear of the big boss' whims, and no danger of being fired (a very important factor and one which is magnified in importance whenever a new management takes over a big business). When and if you do decide to open your own business, no matter in what phase of the metal-working industry it may be, obtain the aid of an experienced sales promotion, advertising, and publicity man, and the services of a reliable industrial advertising agent. Oftentimes, it is the sales campaign and the creative thinking behind it which will determine the difference between success and failure of your enterprise. Investment in sales counsel is a type of business insurance, and the wise small machine shop owner will seek it out and use it to advan-



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Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

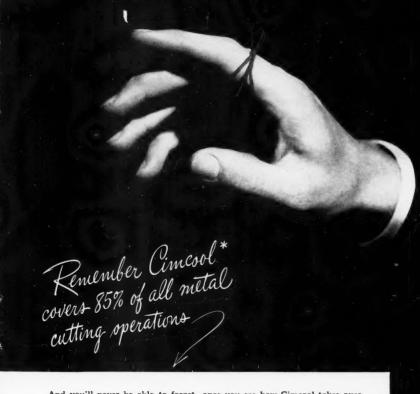
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Cuts fast and cool, gives good finish and Stays Sharp", that is the recent report from a large Wisconsin manufacturer on the 32 ALUNDUM wheels which they use to sharpen high speed steel cutters on their largeroll cutter grinder. They've been enthusiastic ever since they first tried "32" on this job in 1946 using a 32A60-18VBE. They remove up to .050" of stock at .002" per pass, holding face runout to .0005" and periphery runout to .001" with no difficulty.

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# It's Really Easy with Cost Cutting 32 ALUNDUM Tool Grinding Wheels

## 4 to 6 Times Faster Cutting

In plant after plant they are finding that the extra sharpness of 32 ALUNDUM wheels enables them to remove stock from high speed steel and cast alloy tools at the rate of .002" to .003" per pass as compared to .0005" for ordinary tool wheels.

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And "32" wheels stay sharp longer. You can go all the way around even a large multi-tooth cutter without having to stop and dress a 32 ALUNDUM wheel.

### **Less Tool Spoilage**

32 ALUNDUM grinding wheels cut so cool that there's far less danger of spoiling heat-sensitive high speed steel tools—even with inexperienced operators.

# Here's the Reason for "32's" Record Breaking Performance — The grains of

32 ALUNDUM abrasive are produced by a special, patented electric furnace process which gives them many sharp points on all sides—no matter how they are bonded into a wheel each grain presents one or more cutting faces. And because the grains are over 99% pure fused alumina they have exceptional resistance to dulling.

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162 Pages of Practical Information—That's what you got in this Norton Handbook on Tool Room Grindings. If tells you when to use 32 ALUNDUM wheels and when to use the other Norton abrasives—such as 38 ALUNDUM, 37 ALUNDUM and regular ALUNDUM, to cut lool room costs. Send for your capy—just as it for form 835-A.

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# Mechanizing Quality Control

In which the author describes "banding" of indicators and a "two out of three" system.

By CLIFFORD W. KENNEDY

WHENEVER workpieces are carved out of metal, whether in lathe, screw machine, grinder, boring machine, miller, or whatever, some proportion of the pieces seem bound to come out either over tolerance or under. Yet, with the use of certain newly developed quality control techniques available, the customary amounts of scrap and rework which impair average machine production are ridiculously unnecessary.

Though the proper application of quality control will hold outsize work down to under 1 per cent of total output it isn't necessary to explore all the mathematics, theory and philosophy of statistical quality control. The mathematician has done his work well and reduced the necessary information to tables or, at least, to simple formulas. Certainly statistical methods are no harder on the mechanic than the use of a sine bar or trig tables. In fact, quality control limits can be put on gages and instruments used at machines in such a manner that, with proper use, no scrap at all need be made. It is necessary, however, to get rid of some traditional conceptions in connection with machining capabilities, settings, measuring methods and tolerances.

No machine operation, of course, is

capable of producing pieces exactly alike dimensionally. Duplication, in other words, is impossible. Any machine has a range, so-called, an inherent range of variation brought about by a legion of conditions: type of material, condition of tool or wheel, worn bearings and ways, vibration, cutting speeds, action of chucks or centers, to say nothing of tool setting, indexing or direct operator influence.

The conception of machine range or variability can be illustrated, as it is in Figure 1, by measuring a selected dimension on a succession of, say, twenty pieces as they drop from the machine. The actual diameter dimensions of such a group of work appear graphically in Figure 1 as if a chart record had been kept of them. The blue print for this particular work prescribed tolerances of  $\pm$  .001 inch.

The indicator reading of the diameter of the first piece of the twenty shows at the top of Figure 1 (marked by a dot) as plus .0002 inch. The succession of dots below diagram the series of similar indicator readings for the other nineteen pieces in a row as the lathe made the cut and the measurements were taken.

During this short period the operator made no change of setting or indexing nor was the tool sharpened. So the chart of Figure 1 really portrays the natural variations in diameters produced by the existing condition of the machine, material and tool—conditions or variations over which, to a very considerable extent, the operator has little or no control.

While the measurements diagram-

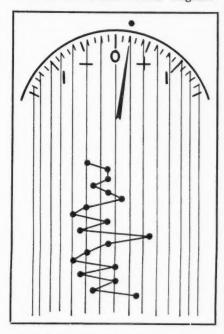


Fig. 1—Graph illustrating the idea of machine range or variability.

med in Figure 1 show the machine setting nominally at a few tenths below the mean, the work will soon get over on the high or plus side, from normal tool wear, as indicated in the chart of Figure 2.

Most operators, too, deliberately work on the high side and a picture of their work would more normally look more like Figure 2 than Figure 1. An operator does this because subconsciously he realizes that oversize pieces could be reworked but he can't do a thing about undersize parts.



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Don't forget to ask for a free copy of the Victor Metal Culting Booklet for your pocket or tool kit and the Victor Wall Chart for your shop. They'll help you get the maximum efficiency from your metal cutting saw blades.





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Makers of Hand and Power Hack Saw Blades, Frames and Band Saw Blades

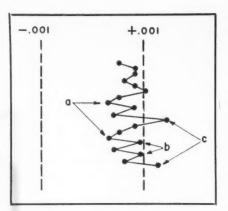


Fig. 2—The measurements charted here provide an indication of normal tool wear.

Now comes the meat of the situation. Traditionally, the operator measures one piece every so often in order to check his setting. In many shops this control is rigidly bracketed in his operation cycle which requires him to measure, say, every tenth piece or to check on the dimension of one piece every ten minutes, or something like that. If he measures more pieces or indexes the tool more often than the exact time and motion standard prescribes, he fails to make as many pieces and his pay envelope suffers.

In picking up the one piece to be measured, in accordance with his time cycle, one of three things may happen. If that piece happens to be of the size of a, Figure 2, there's no worry. If the one piece checked happens to be in the c group he will usually be alarmed at oversize work and reindex his machine.

But he may happen to get one of the b group (the diameter of which would still go in his fixed snap gage). He sees that, while the work is right at top tolerance, it is not oversize and he lets the machine run on.

What the time and motion engineer forgets, in establishing a gaging cycle, is that the machine itself pro-

duces variations, that it has an inherent range, and also that a stipulated selection of a single piece for a tolerance check based solely on some regular time interval may come up with an a size piece (Figure 2) or even a b size piece. Even so the machine is simultaneously producing the oversize c pieces. The operator and toolsetter forget almost exactly the same thing and ignore the fact that, though the work they happen to measure has not actually gone over tolerance as at b, Figure 2, there is still bound to be oversize work in the batch.

Where the machine happens to have a widespread inherent range of variation the operator soon discovers he is getting an excess of oversize pieces. Usually then he clamors for more tolerance. So, engineering yields and the tolerances are doubled. But the operator persists, traditionally and habitually, in keeping at the high tolerance. The paradox appears in the diagram of Figure 3 where the tolerances have been doubled from ±.001 inch to ±.002 inch. Widening the tolerance usually has no effect in the end because the operator inevitably gets over to the high tolerance eventually, the pieces he happens to measure still fit

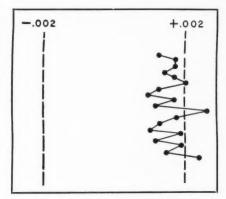
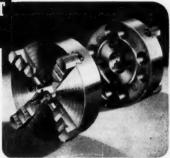


Fig. 3—Illustration showing that widening of tolerance has little effect on reduction of oversize workpieces.

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As knurled knob is turned, torque is applied which is transmitted to screw, until prescribed resistance is developed. At this point, ball is depressed into cavity and applied



torque to screw ceases. No further pressure can be applied. "Tight is tight enough."

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Ideal for use where space is limited. Work is supported on end opposite screw section which now fits into tapped

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### ADJUSTABLE "SET YOUR OWN"



This latest adjustable type provides a torque thumb screw which tool engineers can set themselves to obtain end pressure they desire from 5 to 50 lbs

### **New Distribution**





VLIER MANUFACTURING CO.

4552 BEVERLY BOULEVARD LOS ANGELES 4, CALIFORNIA his snap gage, and there is still oversize work, all as Figure 3 points out.

One obvious answer to the dilemma is to artificially narrow the tolerances. Many design engineers cut a required or sensible tolerance in half on the cynical premise that half of production will be out of tolerance anyway

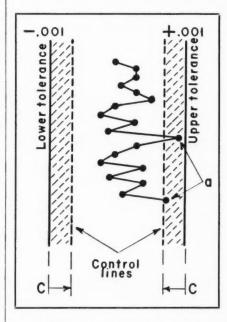


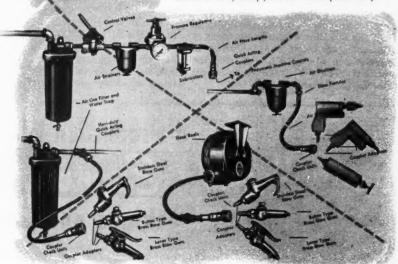
Fig. 4—Illustration showing method of artificially narrowing tolerances.

and only by so doing will they come out with the desired fits at assembly that they originally wanted. A few department managers will mark over blue print tolerances cutting, say, a  $\pm .002$  inch tolerance to  $\pm .0015$  inch or even to  $\pm .001$  inch for the operator.

To a degree, the quality control engineer does the same thing, but more scientifically perhaps. Figure 4 illustrates his principle, applied to the same machine and batch previously illustrated. "Control" lines or zones

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Start with, improve with, replace with genuine Schrader Air Control Products Regardless of the kind of air system you now have or whether you are planning to expand the use of compressed air in your operations...
you owe it to yourself to see Schrader now! It's the most modern line—with many new types of controls, the complete line—with practically everything you can think of, every product planned to increase production, save air, reduce maintenance, and eliminate air losses. And it's backed by Schrader factory representatives and the nation's finest distributors—ready to help you. Send in the coupon ... today!



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January, 1950

MODERN MACHINE SHOP

MMS

TABLE I

Tolerance Spread	C value
.0005"	.00008"
.001	.00016
.002	.00032
.003	.0005
.004	.0006
.005	.0008
.006	.001
.008	.0012
.010	.0016

are added and the mechanics of the situation is then altered by the following prescription. If or when, in the course of the production cycle, pieces of the size of a, Figure 4, are detected, even though they are not oversize nor even quite up to tolerance,—when, in other words, his work has entered the warning zone—it is time to reset, reindex, and/or sharpen the tool.

The warning zone or control limits are less than the tolerance limits by an amount "C", Figure 4, and the correct mathematical C values are given in Table 1 for the common tolerance spreads. (By tolerance spread is meant the total tolerance. The tolerance, is 0.02 inch. The tolerance spread for  $\pm .001$  inch, for instance, is 0.02 inch. The tolerance spread for blue print figures of +.000 — 0.002 inch is 0.002 inch).

In other words, under this control system, where the blue print calls for  $\pm .001$  inch, when a check piece that measures more than + .0007 inch is discovered, it is time to take warning—it is safer then to readjust the machine. If the mechanic waits until he finds work measuring fully up to + .001 inch he has already contaminated the batch with oversize pieces.

The same principle applies of course at reindexing and setting up to the low side of the tolerance. Where test work measures smaller than —.0007



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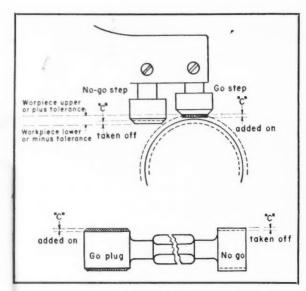


Sets come in pairs for gaging any number of similar holes. All sets include stands of 3 plates and cover, so that gages stand upright. Drill size is plainly stamped in front of each hole, together with decimal equivalent to the ten-thousandth of an inch.

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them on the indica-

Fig. 5 — Illustration showing methods of narrowing tolerance spread.

inch (in this example) it is a good warning that the setting is too close to the jumping off place into scrap.

A very practical use of the C values in Table I can be made either by chrome plating the jaws of fixed snap gages-building them up and narrowing the gap—as shown in Figure 5, or by setting the go anvils of adjustable snap gages not to the blue print tolerances but to the tolerances minus the C value for that particular tolerance spread. (The no-go anvils are either lapped back or adjusted by the "C" modification as Figure 5 also indicates.) In a similar fashion, the diameters of no-go ends of plug gages are ground or lapped down a few tenths, by an amount equal to 2 x C for the particular tolerance spread. (The go plug is similarly built up. usually by chrome plating, by 2 x C).

An indicating gage can be "protected" in the same manner either by shading control or warning zones in on the indicator dial (usually with red pencil) or by cutting out little wedges of colored Scotch tape and sticking

them on the indicator crystal to accomplish the result illustrated in Figure 6. (If an indicator is equipped with so-called tolerance hands or masks, they can be set to tolerance minus "C").

The C values appearing in Table I are based on a certain set of quality control mathematics by which the correct or limiting range of variation inherent in a machine can be calculated for any

particular tolerance spread.\* In other words, if a machine is to produce within certain tolerances, its inherent range of variation cannot safely exceed a certain number of thousandths of an inch. Where, for instance, gages have been modified by the proper "C" protection and where in spite of all efforts at reindexing, resetting, sharpening tools, and so on, outsize work persists, it is a conclusive sign that the machine needs overhauling, increased tolerances are justly demanded, perhaps, or the operation needs possibly to be done in another type of machine. A drilling, reaming or boring operation, for example, might be switched over to broaching or honing in order to secure the necessary size control. Many times a change in

<sup>\*</sup> Study of this philosophy can be started in simple fashion in the "Dimensional Quality Control Primer" issued by the Federal Products Corporation, 1144 Eddy St., Providence, R. I., or from the author's book: Quality Control Methods, Prentice Hall, New York. Both contain bibliographies of books that delve even farther into the statistical principles and theories involved.



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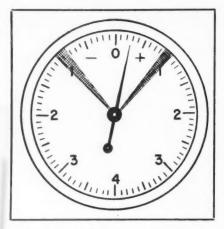


Fig. 6—Illustration showing "protected" indicating gage.

the type of tooling, or the kind of material, or buying a new chuck effects the results desired.

At all odds, where the operator is

to check only one piece at a time, at more or less stated intervals, he can be about 90 per cent sure that his production contains no oversize or undersize work if he uses "C" modified gages or takes action when his normal measurements show the dimensions he is working to have entered the warning zone.

Another system of mechanized quality control similar in appearance to the "C" protection zone system described above is also suggested in the "banding" of an indicator as shown in Figure 6. It has the advantage, if arrangements will be made to follow it, of making 99 44/100 per cent certain that no scrap or rework will contaminate the machine production so far as the control of any single dimension is concerned.

This time the gage indicator control zones are marked in, following the "A" values in the Table II.

Comparing the A values in Table II





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TABLE II

Tolerance Spread	A values
.0005"	.00014"
.001	.0003
.002	.0006
.003	.0009
.004	.0011
.005	.0014
.006	.0017
.008	.0023
.010	.0029

with the C values in Table I, it will be seen that the A value is consistently greater than the corresponding C value for each tolerance spread. At first glance it looks like a further constriction of available tolerance spread. But now, however, one of the most powerful and sensitive statistical quality control techniques is to be followed: that of controlling the size

of work by averages.

Under this system the operator measures the relevant dimension on 3 pieces at a time. If the indicated measurements of 2 out of the 3 appear between the warning bands A and A, Figure 7,-if the indicator hand, in other words, falls in the "white wedge" at least 2 out of 3 times, even though the indicator hand swings into one of the A warning zones for the third measurement-the operator can be 99 44/100 per cent sure the work being put out in the interval represented by his sample of 3 pieces is all inside tolerances.\*

If 2 out of 3 measurements, or all 3 of the sample, show in one of the "A"

\* The fact that a determination is based on the locations of 2 readings out of 3 has very much the effect of an empirical calculation of the actual arithmetical average of 3 readings, or of getting the median value. The "A" con-trols (Table II and Fig. 7) apply to the varia-tions which the average or median dimension may assume without allowing individual oversize or undersize dimensions to be formed.

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CORPORATION Detroit 32, Michigan warning zones, the machine's production is undoubtedly being contaminated with outsize pieces—or is about to be—and it is time to reset.

If any one or more of the indicator readings disclose measurements beyond either tolerance, the operator of course then knows that out of tolerance work has already arrived.

Where 2 out of 3 measurements fall in the upper or plus A zone, Figure 7,

the work of course is on its way to oversize. Conversely, 2 out of 3 readings (or all 3) in the minus A zone point to undersize work or scrap. The indicator, in other words, readily tells the operator the direction his trouble is coming from.

One more thing: the pair of A zones on an indicator can tell whether or not the inherent range of the machine, the natural size variations from it. will

cause out of tolerance work despite most normal efforts of the operator to prevent it. For, if in measuring the 3 piece samples, the indicator hand consistently swings into the minus A zone. say, for one measurement and as consistently over into the opposite, the plus A, zone withanother measurement, it is a mighty good indication tha the machine or tooling is not intrinsically capable of meeting the prescribed tolerances. All this even though no strictly over tolerance work is immediately noted.

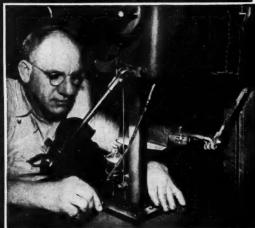
The main resistance to the 2 out of 3 system stems from tradition and habit and also from modern day time and motion tendencies for establishing gag-



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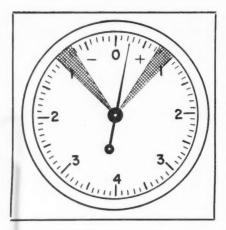


Fig. 7—Illustration showing "banding" method applied to indicator gage.

ing operations based on the examination of a single piece at a time as part of the work cycle. As an example,

suppose the stereotyped operating cycle calls for measuring one piece every five minutes. It means that the operator gropes for his mike, snap gage or indicating gage, reaches for a workpiece, measures it, and then disposes of instrument and workpiece. Five minutes later he goes through all the motions again. Contrast this with picking up 3 pieces at once, then the mike or gage, making the measurements, and then putting down the gage and workpieces. This he does once every fifteen minutes. He saves at least two-thirds of the motions, time and energy hunting for his gage, setting it down and getting rid of the workpieces by using them once every fifteen minutes in contrast to once every five minutes.

Most of all, however, by observing his work in groups he knows more about it. The measurement of a single piece tells little or nothing about the





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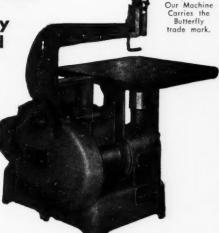
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direction the work is taking. It's like viewing the only photograph of one of the plays in a football game. You see the ball in the runner's hands but the lone snapshot does not reveal whether he's going to crash through off tackle, skirt the end, or be thrown for a loss.

Articles on the subject of quality control for the machine shop appearing in the August 1949 and November 1949 issues of Modern Machine Shop throw other light on the ideas of group measurement and machine capability. Review of them may make the 2 out of 3 techniques more appreciated.

Any shop that will undertake the easy job of comprehending the group system of checking machine work plus the "C" zone or 2 out of 3 concepts just described can cut its scrap and rework bill to the bone. There is a tendency for quality control work to remain entire-

ly in the hands of the inspector or to be carried on by a group or department exclusively delegated the responsibility. Little emphasis need be laid on the idea that the quality of a product rests, in the final analysis, in the hands of the operator, the producer. Whatever will quicken the worker's interest and pride benefits the product. The suggestions made above fit the philosophy of this last statement like a glove.

Automatic Circular Dividing Machine. Bulletin 182-49 published by The Gaertner Scientific Corp., 1291 Wrightwood Ave., Chicago 14, Ill., describes and illustrates a fully automatic machine for the production ruling of precision circular scales according to any standard pattern of lines having industrial or scientific application. The method of operation and construction of the machine are briefly outlined, and detailed specifications are presented. Copy free.

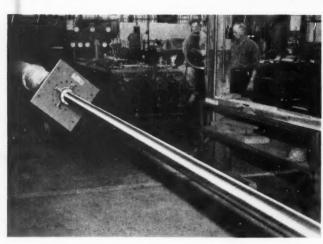
### Mammoth Hydraulic Cylinders

THE Logansport Machine Co., Logansport, Ind., manufacturer of air and hydraulic equipment for industrial use, has completed production on two huge hydraulic cylinders of the type illustrated herewith, which are believed to be the largest ever built.

The physical and operating features of these great cylinders are as follows: bore, 14 inches; stroke, 237 inches; 5-inch diameter stainless steel piston rod weighing 1600 lb.; tubing is of centrifugal cast steel; total weight of cylinder and piston,  $3\frac{1}{2}$  tons. Overall length of equipment with

piston rod extended is approximately 500 inches. The cylinder holds approximately three barrels of oil and imparts 76,000 lb. of impact force when operating at 500 p.s.i.

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# Measuring The Mouth Diameters of Tapered Holes

By W. M. HALLIDAY

IN the manufacture of molds, dies, jigs, fixtures, and other similar products, it is often necessary to bore tapered holes to precision accuracy. The machines most commonly used for the boring operations are lathes and jig boring machines. Quite frequently, the machinists have a considerable amount of trouble in boring the tapered holes successfully and accurately due to the fact that it is difficult for them to measure the maximum diameters of the holes. This fact is especially true if the large end of the hole coincides with an end face of the workpiece.

### Objections to Customary Gaging Methods

The mouth of a tapered hole is measured to determine either the progress being made in the boring operation or the agreement of the finished bored hole with the dimensions allowed. The difficulties of taking such a measurment are best described by referring to Fig. 1. A tapered hole, A, is machined in workpiece B; and the large diameter of the hole coincides with the end face, C, of the workpiece.

A vernier caliper gage is used to measure the maximum diameter, **D**. The difficulty in measurement lies in locating the contact points of the gage on the extreme edges of the hole. The gage is usually inserted into the hole for a short distance and then withdrawn slightly in order to take a reading; it may be seen, then, that the reliability of the reading will depend, to a large extent, upon the skill and experience of the operator. When using this method of measurement, there is a tendency to bore holes slightly over-

size due to the difficulty of locating the contact points of the vernier exactly on the rim of the hole.

One method of overcoming the difficulties of the vernier gage method is to use a master taper plug such as the one shown in Fig. 2. The plug is made to have a short knurled section, a short parallel portion which is turned

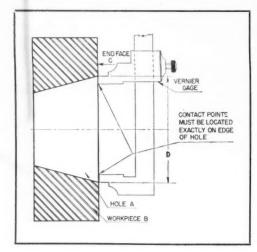


Fig. 1—Drawing of a workpiece having a tapered hole, and method of measuring the mouth diameter by using a vernier gage.

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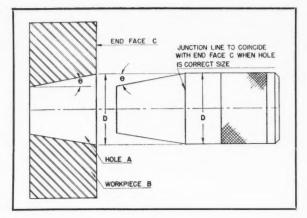
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Fig. 2—Sketch showing master taper plug used to check the large diameter of a tapered hole.

or ground to the exact dimension of the large end of the tapered hole in the workpiece, and a tapered end of the exact angle and length as required in the workpiece. The line formed at the junction of the parallel and tapered portions

of the plug is used as a setting line in determining the diameter of the bored hole; if the mouth diameter of the hole is correct, the line will coincide with the end face of the workpiece.

Although the plug method gives



reliable results on non-precision machine work, it may not always be regarded as completely accurate in cases where close tolerances must be maintained. Also, the method tends to make the job slow and tedious since numerous checks must be taken with

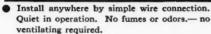


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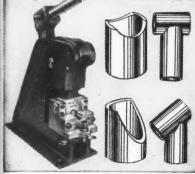






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the plug, particularly during the final stages, in order to determine progress and accuracy.

An adaptation of this method consists of the use of a plug which is machined to a definitely known overall length. The distance, then, which the plug extends out from a hole of correct size will be a fixed amount; and this amount, when added to the width of the workpiece, will give another fixed amount. A depth gage may then be used to check the distance between the end of the plug and the end of the workpiece, and thus check the accuracy of the tapered hole. While this method offers a high degree of precision due to the fact that direct measurements are substituted for visual inspection, the operation is still a lengthy one; and, of course, the master plug may only be applied to one particular size of hole.

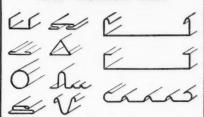
### An Improved Gage Design

In order to eliminate the disadvantages of the methods which have been mentioned, and to provide an all-purpose measuring instrument which may be used on holes of widely different diameters, an extremely simple and interesting gage has been designed. A drawing of the instrument is shown in Fig. 3, from which it may be observed that the tool consists of three main members.

The body, E, is made from a rectangular piece of mild strip steel which is surface ground all over in order to make all sides perfectly flat and opposite sides perfectly parallel. The body is made approximately one inch longer than the diameter of the largest hole which is likely to be measured with the tool. A slot, F, is machined as shown in the body; the slot is machined carefully so that its sides will be parallel to the outside edges of the body.

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1-A	1/2, 3/4, 11/8	Pc. 1/4. 3/8	12" to 16"	26.35	
2-A	is, 12, 176	ia, ic. 3/8	16" to 18"	35.15	
3-A	3/4, 11/8, 11/2	1/4. 3/8. 1/2	20" to 22"	61.55	
4-A	18, 170, 17/8	rc. 3/8. 5/8	24" to 36"	87.95	
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\* 1/8" diameter bar included in set is solid tool steel.

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123A	le"	9.,	10	3.50
124A	5/8"	10"	18	3.50
125A	3/4"	11"	1/4	4.35
126A	19	13"	T'e	6.30
127A	1"	14"	16	6.30
128A	11/8"	16"	3/8	8.75
129A	116"	18"	3/8	12.30
130A	11/2"	23"	1/2	16.30
176A	17/8"	30"	5/8	36.35
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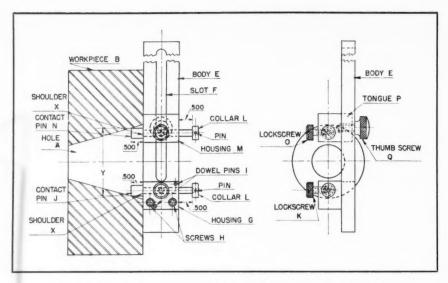


Fig. 3—Drawing of an improved tool for measuring tapered hole diameters.

ing, G, of the same width as the body, which is fastened by means of two screws, H, and two dowel pins, I. A hardened and finely lapped steel contact, or measuring, pin, J, is positioned in a carefully bored hole in the housing. The pin is held in place by means of a hard brass, knurled head lock screw, K. Pin J is machined to three diameters; the middle diameter is approximately ½ inch smaller than the largest diameter, and it is machined to provide a close sliding fit within the housing hole. The end oppo-

site the large end is reduced still further to accommodate a check collar, L, which is pinned in place. The large end of the pin is finished off perfectly square to have a fine, sharp corner; and this large diameter section is exactly 0.500 inch long. The length of the middle section is exactly equal to the width of the body plus 0.500 inch.

Another housing unit completes the instrument. Housing **M** is similar to housing **G** in that it is used to accommodate a contact pin, **N**, and a lock screw, **O**, which are identical to the

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ones which have been mentioned. However, housing M differs from housing G in that it is not positioned permanently but is instead provided with a tongue, P, which slides on slot F. The tongue is tapped to accommodate a knurled head thumbscrew, Q; the thumbscrew is used to lock the housing in any desired position along the slot.

### Operation of the Gage

The application of this gaging device is extremely simple, rapid, and sure. The first step is to make certain that the shoulders, **X**, of pins **J** and **N** bear up against the side faces of the housings **G** and **M**, and that the lock screws **K** and **O** are tightened down with the pins in this position. Each pin then projects exactly .500 inch beyond the side of body **E**. Thumbscrew **Q** is then unscrewed slightly so that the housing **M** may be moved, and then the tool is located in the hole to be

measured in the manner shown in Fig. 3. Pin J is positioned originally against one side of the hole, and housing M is moved out gradually until pin N contacts the side of the hole directly opposite. The housing is locked in this position by means of thumbscrew Q, and then the instrument is removed from the hole and the distance across pins, Y, is measured with a micrometer.

Lock screws **K** and **O** are now unscrewed, and contact pins **J** and **N** are moved until the under sides of the check collars, **L**, coincide with the sides of the housings, the contact pins now extend out exactly 1.000 inch beyond the side of body **E**. Thumbscrew **Q** is then loosened and a similar procedure is followed in obtaining a reading of the hole diameter at this second station. In order to obtain the diameter at the mouth of the bored hole, the second measured distance is subtracted from the first, and then this



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difference is added to the first reading.

An actual example will perhaps help to demonstrate the simplicity and accuracy of the method. Thus, with the pins set to project out .500 inch from the body, the reading of the distance **Y** across pins is found to be 4.648 inches. With the pins set to project out 1.000 inch, the micrometer reading taken is 3.814 inches. Subtracting the second from the first, a difference of 0.834 inch is obtained. Then, by adding 0.834 inch to 4.648 inches, which was the first reading taken, a mouth diameter measurment may be derived to be 5.482 inches.

#### Advantages

There are many advantages to a tool of this type, some of which are listed as follows:

 A tool of this design gives results to a high degree of accuracy, and the accuracy depends upon actual measurements rather than upon visual inspections.

- (2) It is simple to set and also to apply to the workpiece while, at the same time, it involves a minimum amount of arithmetical calculations. The calculations are of a straightforward nature which may be easily comprehended by the machine operators.
- (3) The tool is quite inexpensive to make.
- (4) The tool may be applied to holes of widely different diameters due to the adjustment provided by the movable housing.
- (5) By reducing the diameters of the contact pins considerably, holes of very small diameters may be checked with equal facility.
- (6) Holes may be checked quickly and accurately during the progress of the boring operation; and, at each check, the exact amount of metal to be removed to bring the hole to proper size may be determined. Such a check is an invaluable aid to the machinist.

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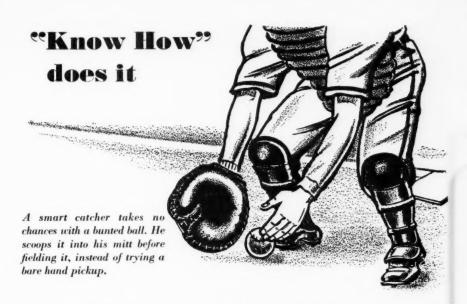
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#### 7½ Ton Marine Bull Gear Welded at Westinghouse Plant

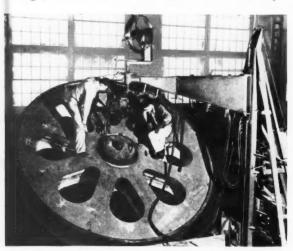
THE accompanying illustration shows a seven and one-half ton bull gear being fabricated at the Sunnyvale, California, Works of Westinghouse Electric Corp. The hub is being welded to a centerplate as flux is fed automatically and the wheel is turned slowly under the Unionmelt welding machine. The gear shown is one of two similar gears used to drive a large, marine ore carrier. The two

gears are used in the final stages of a gear train to reduce the speed to the propeller shaft from 6000 rpm to 100 rpm; they take the full load of a 7000 h.p. marine turbine propulsion unit.

The gears are made from two kinds of steel; the rims, which are hobbed later with 693 helical teeth, are of high-carbon steel to withstand great pressures under continuous operation; and the other parts—the hubs, the centerplates, and the ribs—are of mild or medium carbon steel.

Despite the size of the gears, they are held to close tolerances so that, when they are completed and installed

in a ship, they will give trouble-free operation. Since the slightest inaccuracy in the gear teeth will cause excessive vibration and noise, inspection is rigid; and even a small imperfection will cause rejection. Tolerances for the teeth may be as close as one ten-thousandth of an inch.



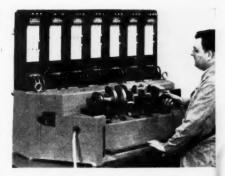
The hub of 7½ ton bull gear is shown being welded to a centerplate.

(Right) Sheffield gaging unit which uses 20 Precisionaire tubes for checking dimensions of automobile crankshafts.

#### Sheffield Unit for Checking Automobile Crankshafts

GAGING machine which uses 20 A Precisionaire tubes has been developed by The Sheffield Corp., Dayton 1, Ohio for checking various dimensions of an automobile crankshaft. The accompanying illustration shows a crankshaft in gaging position in the unit.

The five main bearings are checked simultaneously by means of five Ushaped Airsnaps. Each of these Airsnaps is provided with three pairs of jets so that the bearing surfaces may be checked at three places, and the Airsnaps are floated so that they



may move forward and backward to allow for misalignment due to possible warpage in the crankshaft. Two other Precisionaire jets check a seal diameter and the width of the rear main bearing. The diameter at each end of the pin bearing and the breakdown of the radius at the cheeks are checked manually by means of a portable Airsnap having three sets of iets.



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Fig. 1—Shown here are three H-P-M hydraulic presses used for drawing aluminum cooker shells. Two special conveyor racks may be seen between the presses.

bulged side section to accommodate the sliding electrical connections for the heating element.

The problem of producing these irregularly shaped cooker shells on a mass production basis was solved by Hotpoint engineers in cooperation with engineers of The Hydraulic Press Mfg. Co. of Mt. Gilead, Ohio. In addition to standard deep drawing operations for the cooker shells, an unusual bulging method involv-

ing the use of high-pressure hydraulic fluid was developed.

Due to the depth of the cooker shells, three drawing operations are required for each part prior to the bugging operation. The drawing operations are performed in three H-P-M double-action hydraulic presses which draw a 21 inch diameter blank, 0.040 inch thick, to a depth of 9¼ inches. Annealing between draws is not required. The time required for each

#### Drawing and Bulging of Aluminum Cooker Shells

NE of the unique features of a new Hotpoint electric range is that the heating element at the bottom of the deep well cooker may be raised to provide an additional surface burner when the deep well cooker is not in use. In order to provide this feature, Hotpoint engineers developed an aluminum cooker shell having a

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Fig. 2—Close-up view showing hydraulic bulging die.

drawing operation is approximately ten seconds. Specially designed conveyor racks have been designed which permit the drawn shells to be rolled between presses, thus eliminating unnecessary handling. The relative positions of the racks between the presses may be seen in Fig. 1.

After the third drawing operation, the cooker shells are washed and annealed; and then the drawn shells are delivered to the fourth H-P-M hy-

draulic press which is equipped with an hydro-bulging die. A drawn shell is sealed in the die by the press; and



hydraulic fluid, under pressure of 2000 p.s.i., is forced into the drawn shell to bulge it to the desired shape. The



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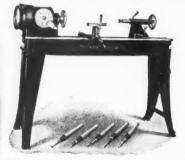
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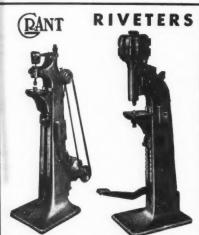
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THE GRANT MFG. & MACHINE CO. 96 Silliman Ave. Bridgeport 5, Conn. fluid is then decompressed, the die is opened, and the bulged shell is released. An average of 165 shells per hour may be bulged in this press. A close-up view of the bulging die is shown in Fig. 2; a drawn shell prior to bulging may be seen at the lower right, and a bulged shell may be seen in the operator's hands.

The new H-P-M hydro-bulging process offers a practical solution to the problem of producing irregular shapes. Close tolerances may be maintained; and, according to the manufacturer, scrap losses may be kept to an absolute minimum. The process is also being used successfully in the production of milker pails, cream separator supply cans, cooking utensils, silver plated ware, and similar products.

#### Batch Discharge Replaces Method of Hand Unloading

NE ingenious method of unloading small castings and machined parts is shown in the accompanying illustration. The parts are carried in a special hinged drop-bottom bin on a Worksaver-type Yale fork truck; and when the proper work station is reached, the main section of the bin is raised, the bottom section of the bin is lowered, and the parts are discharged in the chute formed, as shown. The two obvious advantages of this method over the method of hand unloading are (1) a definite decrease in unloading time, and (2) the fact that employees are saved from possible cuts and pinched fingers due to sharp edges or the shifting of parts in the bin.

A large eye is welded to one end of the main section of the bin, and the bottom section of the bin is hinged to this eye. A chain-operated hook is provided at the top of the truck mast to engage the eye in order to hold the main bin section in a raised position. Drop-bottom bin being used for discharging small parts.

In operation, a loaded bin which has been carried to the proper work station is raised, by means of the truck forks, until the height is sufficient for the chain-operated hook to be engaged in the bin-eye and thus hold the main section in an elevated position. The forks of the truck are then lowered; and, simultaneously, the bottom sec-

tion of the bin is rotated on its hinge and the parts are discharged. By regulating the angle through which the bottom section is rotated, the rate of discharge may be controlled.

After the bin has been emptied, the truck forks are raised to bring the



bottom bin section to its normal position, the truck hook is disengaged from the bin-eye by the operator, and the forks are lowered to bring the bin to its original position. The empty bin may then be transported for reloading, or it may be stored; as may be





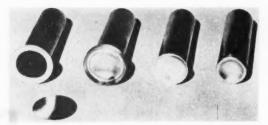


Fig. 1—Typical application of ring weld technique of cold pressure welding may be seen in hermetically sealed containers. Steps shown (left to right) are flanged tube before welding, tube after welding, tube after excess metal has been trimmed off, and tube after weld has been dressed over.

seen, lugs are welded to the top of the bin to facilitate the stacking of similar bins.

The equipment used is manufactured by the Philadelphia Division of The Yale & Towne Mfg. Company.

Cold Pressure Welding

THE method of welding by means of pressure at room temperatures, or cold pressure welding, has been developed by the General Electric Company, Ltd., of England; and it is controlled in the United States by the Koldweld Corporation of New York City. The process may be applied successfully to several of the non-ferrous metals—aluminum, duralumin, cadmium, lead, copper, nickel, zinc, and silver; however, for the present, its most important application is for the cold welding of aluminum. Experimental work on cold pressure welding of ferrous metals is currently being conducted, but research is not complete as yet.

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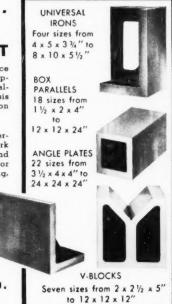
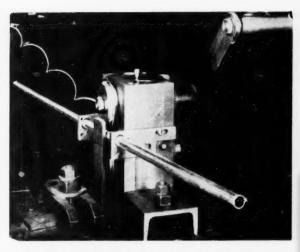


Fig. 2 — Machine used for making seam welds. Trimmed metal may be seen curling away.

Aluminum surfaces which are to be welded must be entirely free from oxide films which begin to form on the exteriors immediately after the surfaces are exposed to the atmosphere. Although the films are thin by ordinary standards, they are thick enough

to prevent good welds from being obtained. These oxides may be removed by standard methods; and once they are removed, the re-formation of oxide films progresses rather slowly. There-



fore, satisfactory welds may be made several hours after the film removal operation if the cleaned surfaces have not meanwhile become contaminated by moisture or grease. Even contam-





ination such as that caused by handling of the material will invariably prevent formation of satisfactory welds.

In the cold pressure process of welding the metal is made to flow away from the welding point as the tools are brought together. It is perhaps surprising that the rate of application of the pressure does not appear to affect the strength of the weld, and that good welds may be made with tools giving either a slow squeeze or an impact. However, the shape of the tool used is an important consideration.

During the runs which have been carried out so far with suitable die materials, there has been very little evidence of die wear. In many applications, however, it will be possible to counteract the effects of such wear by occasionally resetting the die closure.

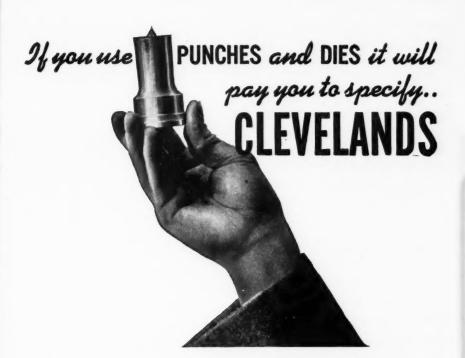
Three somewhat different techniques have been developed for the cold pressure welding process—the straight weld, the ring weld, and the continuous

seam weld. The straight weld technique may be used for box seams, for sealing tube ends, and for other similar forms of lapped joints which are almost equivalent to butt welds. The ring weld technique may be used for sealing the end of a flanged tube, as illustrated in Fig. 1; for joining a flanged tube to a plate for making hose connections, and for joining two discs together to form an air pressure cell. Wheels also may be constructed, using this technique, by taking advantage of the natural flow of the material in order to form the desired shape. Among the important applications of the seam weld technique are included tube-making and sheathed cables. A typical continuous seam weld application is illustrated in Fig. 2.

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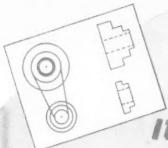




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#### IDEAS FROM READERS

#### Assembly Spot Welding Technique for Aircraft Parts

By GILBERT C. CLOSE

SPOT welding production has been stepped up at the Northrop Aircraft, Inc., plant by the use of a technique which the engineers call "assembly spot welding". By using this technique, several pre-welding steps, which were formerly considered necessary, are eliminated.

In a conventional spot welding operation, the components of a given unit are first jig-assembled; and then they are trimmed, fitted, and removed from the jig for cleaning and etching. The components must then be rejigged prior to spot welding; and some components, especially those of sheet metal in which spring-back tendencies are inherent, are difficult to re-jig to an exact fit.

With the new procedure at Northrop, the unit components are now jigged, trimmed, and fitted and then held

in correct position by means of a few rivets and Cleco clamps. The partially assembled unit is then removed from the jig, cleaned and etched, and finish-welded without rejigging. Fig. 1 shows aircraft engine cowl segments in assembly jigs; a "tacked" cowl section



Fig. 1—Aircraft engine cowl segments in assembly jigs prior to spot welding.



Fig. 2—A "tacked" cowl section, held together by means of a few rivets and Cleco clamps, is shown being etched and cleaned.

#### Handy Small Pin Cutter

By RUDOLPH G. KOPP

CCASIONALLY the writer has found it necessary to cut a few hundred small pins at a time, and so a handy cutting device was made to be used for the jobs. It was found that, with the device, satisfactory pins could be obtained from drill rod, cold rolled steel, and brass.

A sketch of the device is shown herewith. As may be seen, the device consists primarily of two plates, A and B, which are fastened together by bolt C. Some clearance is allowed so that bolt C may serve as a pivot. Holes of

is shown being cleaned and etched in Fig. 2; and in Fig. 3 is shown a final spot welding operation.

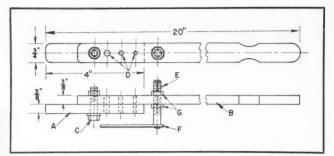
The assembly of the components is loose enough to permit etching solution to enter lap joints, and yet it is

strong enough to keep the relative positions of the components unaltered. A K1-B etching solution furnished by Kelite is used. The solution is sufficiently inhibited to prevent chemical attack and deterioration of the removable and re-usable Cleco clamps.

Elimination of the rejigging operation through the application of the "assembly spot welding" technique has resulted in the saving of a considerable amount of time without a reduction in the quality of the finished product.



Fig. 3—Illustration shows final spot welding operation.



Sketch of handy cutting device for small pins.



justed until the distance between the bottom of plate **B** and the top of positioning plate **F** is equal to the required

height of the pins being cut. The round stock is next inserted into the appropriate hole until it rests on plate **F**; and then plate **B** is rotated, this rotation providing for the desired cutting action. Despite the fact that plates **A** and **B** are only cold rolled steel, case hardened at their cutting ends, this cutting device has given satisfactory service for more than ten years and it is still going strong.

different diameters, **D**, are drilled in line through both plates to accommodate different diameters of work. A screw of suitable length, **E**, is threaded through the top plate, **B**; and a thin positioning plate, **F**, is riveted onto the end of the screw. Two nuts, **G**, are used to hold the screw in place.

To use the cutting device, plate A is first clamped in a vise, and then nuts G are unscrewed and screw E is ad-

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#### Special "Half-Hole" Drill Jig

By LEE ROY PERDUE

HALF-HOLES", which were formerly rasped out with a file, are now being drilled with an electric drill at the Texas Engineering and Manufacturing Co., Inc., in Dallas, Texas. As a result, not only has the amount of time required for the oper-



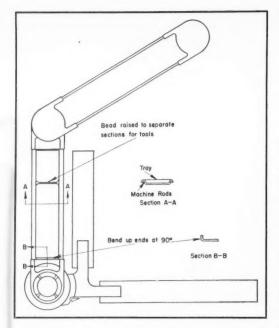
Workman shown using special jig to drill ''halfhole'' in steering collar. A completed ''halfhole'' may be seen at the lower left.

ation been reduced 50 per cent; but also, the holes themselves are cleaner and more uniform. The change in production was made possible by the use of a special "half-hole" drill jig which was developed in the machine shop at the plant. The accompanying illustration shows the special jig in use.

The "half-holes", which are cut in C-54 nose-gear steering collars, are provided in order to make room for tension bolts. The special jig devised







for drilling these "half-holes" consists essentially of a steel plate and a block which may be attached quickly by means of locating pins in order to provide a two-point guide for the drill. According to machinists at the plant, the "half-hole" drill jig eliminates hand work; and yet excessive set-up time, which would be required to perform the operation in a milling machine, is not needed.

Sketch showing a handy tray which is fitted onto the lower arm of a drafting machine.

#### Handy Drafting Machine Tray

By STANLEY R. WELLING

HANDY addition to a drafting machine has been made by the author, and this addition has proved to be extremely practical. As may be seen in the accompanying sketch, the addition is simply a metal tray for pencils and instruments which is fitted across the two cylindrical tubes of the lower arm of the drafting machine and which extends the entire distance between the pivot braces. The tray is formed from a piece of light gage sheet to

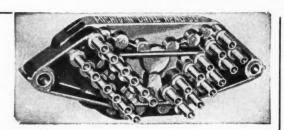
conform to the shape of a shallow box; the side edges are rolled so that they may be fitted over the tubes, and the extreme ends are bent up at right angles. Fasteners are unnecessary since the tray extends over the full open length of the lower arm.

One bead is provided between the sides of the tray not only to strengthen the tray, but also to make two tray sections for segregation of tools. The

Pictured: a 24-Spindle Heavy-Duty Brill Head.

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tray has been a particularly worthwhile addition since the tools are always handy, since the possibility of tools being pushed on the floor and broken has been reduced, and since the drawings may be kept neater and cleaner when there are no tools scattered over them.

#### **A Positive Safety Device**

By ROBERT MAWSON

THE attachment of a positive safety device on a foot operated press is a necessity which should not be overlooked. In plants which do not have these devices the accident rate is high: and the loss of a finger or of a part of a finger is not an uncommon occurrence. In some plants in which safety devices are installed, the devices are adequate, but their design is such that the rate of production is reduced considerably. Described herewith, and shown in the accompanying illustration, is a positive safety device which does not reduce the rate of production.

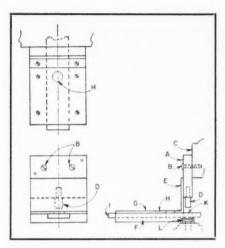
A machine steel member, A, is fastened by means of screws, B, to the ram, C, of the foot operated press. A punch, D, suitable for the particular job, is held securely to the bottom of member A. A sheet steel guard, E, is positioned in front of member A, and the guard is fastened to the press table, F, by means of screws. A suitable guide plate, G, is also fastened to the



table by means of screws; and a hole, H, is drilled in this guide plate to accommodate the blank being formed. A sliding ram, I, thicker than the blank being formed, is located under the guide plate and in a recess in the table: and a hole, similar to the hole in the guide plate and located initially directly beneath it, is machined in the sliding bar. The rear end of I is attached. by means of an adjustable link mechanism, to the foot operated lever of the press thereby controlling the movement of the sliding ram: and this mechanism permits the hole in I to be brought directly under the punch as the sliding ram is moved to the rear of the device. The sliding ram moves horizontally as the press ram moves vertically.

The following is the procedure followed when a piece is formed in the press; A blank is placed through the hole H and into the hole in the sliding ram. The foot pedal is then pushed



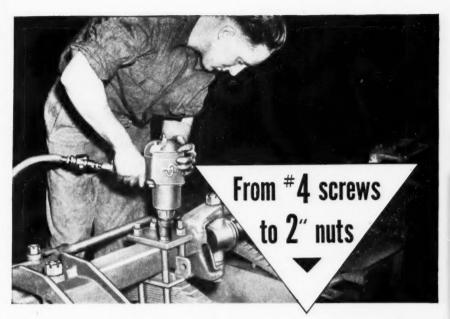


Sketch of a positive safety device which does not reduce the rate of production.

down-the sliding ram, in which the blank is held, is pulled to the rear by the adjustable link mechanism; and, at the same time, the ram and the punch are moved downward. The movements of the sliding ram and the press ram are calculated and set so that the blank will be directly under the punch for the forming operation. The downward movement of the punch is continued, and the force of the punch pushes the formed workpiece through hole K in the press table and into the die, L. Various operations may be performed on the piece in the die, and the finished piece is then dropped through a hole in the die into a container. The foot pedal is then released—the motion of the mechanism is reversed, and the press is made ready to receive another piece.

It may be seen that, with this device, it is impossible for an operator to get his finger under a punch. In addition, this device does not retard production.

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## News of the Industry

#### N. T. D. M. A. Holds Annual Convention

The New York Statler Hotel was the meeting place for the recent annual convention of the National Tool and Die Manufacturers Association, which is composed of over 500 contract manufacturers of special tools, dies, fixtures, molds, gages, jigs, and special machinery used in industrial mass production.

Panel discussions were held at both general sessions of the convention. At the first, "Business Problems of Tool & Die Manufacturers." Alexander W. Luce. head of the mechanical engineering department of Pratt Institute, Brooklyn, N. Y., served as moderator. Moderator at the panel on "Employer-Employee Relations" was John S. Higgins, president and general manager of Whittet-Higgins Co., Providence, R. I. Another highlight of the convention was the impressions of E. Slater of Slater & Crabtree, Ltd., Wakefield, England, a member of the British Tool & Gagemakers Association, who compared the tool and die industries in the United States and in England.

Officers for the coming year were elected at the convention. They are: president—Centre W. Holmberg, president of Aug. W. Holmberg Co., Inc., N.Y.C.; 1st vice president—Herbert F. Jahn, president of B. Jahn Mfg. Co., New Britain, Conn.; 2nd vice president—R. H.

Cope, manager of Bunell Machine & Tool Co., Cleveland, Ohio; secretary—Alfred Reinke, president of Gus Reinke Machinery & Tool Co., Hillside, N. J.; treasurer—Herbert Harig, vice president and treasurer of Harig Mfg. Corp., Chicago, Ill. George S. Eaton will continue as executive secretary. The headquarters of the association are in the Union Commerce Building, Cleveland.

Awards of merit were presented to J. J. Kohl, president of the International Tool Co., Dayton, Ohio, retiring president of the association; Jerome H. Stanek, vice president of Stanek Tool & Mfg. Co., Milwaukee, Wis., retiring secretary of N. T. D. M. A.; and Jack Kleinoder, secretary-treasurer of John Volkert Metal Stampings, Inc., N. Y. president of the N. Y. Tool & Die Institute, which was host to the convention. The convention ended with a dinner dance sponsored by the N. Y. Tool & Die Institute in the Grand Ballroom of the Statler Hotel.

#### Machine Tool Familiarization Training Programs

Sales engineers from metal and petroleum firms all over the nation will gather in Rochester, N. Y., for the fifth in a series of intensive nine-day Machine Tool Familiarization training programs to be

held January 18-27 at the Rochester Institute of Technology. Designed to acquaint the sales or service engineer, manufacturer's agent, tool or accessory salesman with the equipment used by the



New Officers of National Tool & Die Manufacturers Association: (Left to Right, Seated) lst Vice President, Herbert F. Jahn; President, Centre W. Holmberg: 2nd Vice President, R. H. Cope; (Standing) Secretary, Alfred Reinke; Treasurer, Herbert Harig. manufacturer buying his products, the "shop clothes" clinic will enable the student to acquire shop knowledge necessary in promoting good customer relationships.

The staff will be composed of representatives of the machine tool builders and equipment manufacturers, augmented by members of the institute faculty. Six unusual laboratories will be utilized for the clinic. The program will consist of a series of demonstrations and on-the-spot discussions and I a b o r a t o r y periods scheduled from 8:30 a.m. to 5 p.m. each day of the clinic except Sunday.

Tuition for the course is \$100, which includes all course materials and a special dinner meeting for participants to be held Thursday evening at the Hotel Rochester. Inquiries concerning the course should be addressed to the course coordinator: Alfred L. Davis, Associate Director, Evening and Extension Division, Rochester Institute of Technology, Rochester 8, New York.

#### New Whitney Chain Office and Warehouse

Whitney Chain & Manufacturing Co., Division of Whitney-Hanson Industries, Inc., has recently moved to new and larger headquarters at 3317-25 W. Newport Ave., Chicago 18, Ill. The recently completed one-story building is completely modern and includes 15,000 square feet of floor space.

The new location offers up-to-date facilities with which to quickly meet customer requirements. A complete line of American Standard roller chains, silent chains, conveyor chains, couplings, and sprockets will be available from stock at all times.

#### Offers Representation in India, Pakistan and Ceylon

Bakhshi Ram & Co., G.P.O. Box No. 701, Bombay 1, India, is offering exclusive representation in India, Pakistan, and Ceylon to American firms manufacturing the following products: steel files, taps, dies, belt lacings, water pipe, rainwater pipes, bolts and nuts, wood screws, hack saw blades, pipe wrenches, screw drivers, pliers, steel tapes, leather case tapes, drill chucks, lathe chucks, ball bearings, pillow bearings and blocks, small hand tools, and small electric tools for workshops.





#### 1950 Metal Powder Show

The Metal Powder Association, 420 Lexington Ave., New York 17, N. Y., has announced that the 1950 Metal Powder Show will be held in Detroit on April 25-26 at the Book-Cadillac Hotel. The sixth consecutive meeting and exhibit devoted exclusively to the metal powder industry, this show will provide a display of the latest products and developments of producers of metal powders, fabricators of parts made from metal powder, and manufacturers of equipment used in powder metallurgy.

#### Cam Design and Tool Selection Clinic

Process and tool engineers, estimators, cam and layout designers, plant and department supervisors in screw machine companies from the nation's industrial centers will meet at Rochester, N. Y., to attend an intensive Cam Design and Tool Selection Clinic to be held at the Rochester Institute of Technology. The five-day course will open February 20 and will be under the direction of Edward W. Goebel, head of the R. I. T. Screw Machine Laboratory.

# BIG PRESS BRAKE DESIGN SMALL BRAKE COST





Shops that are wasting manpower with hand brakes or tying up big machines with small odd jobs have the an-

swer to their problems in the new Verson 16-48 Press Brake. Compact and low in cost, the 16-48 brings the advantages of power operation and big brake design to smaller shops. Bed and ram length is 48". Capacity ranges from a 48" length of 16 ga. steel to a 24" length of 10 ga. steel. Allsteel construction assures perfect alignment and maximum rigidity. Write for a copy of Bulletin 16-48A; it gives complete design details, specifications and capacities.

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Designed primarily for experienced screw machine personnel, the course will emphasize advanced technology utilized to obtain increased efficiency and lower costs. The program will be conducted on the basis of two twoand-a-half day conferences. The first session, from February 20 to 22, will be devoted to a series of job problems related to Brown & Sharpe cam and tooling. The second, from February 22 to 24, will be comprised of typical jobs on tooling multiple spindle. Applicants may register for either the first or second sessions, or, if desired, for the complete five-day conference, depending on plant equipment or personal interests.

The fee for attending the course is \$30 for each two-a-half day session or \$50 for the combined five - day course. Application for registration should be made direct to the Rochester Institute of Technology, Rochester, N. Y., to the attention of Alfred L. Davis.

#### Corporation Formed to Market Absorbents

Speedi-Dri Corporation has been formed to market the oil and grease absorbents known as "Speedi-Dri" and "Sol-Speedi-Dri" in the New England states, New York, eastern Pennsylvania, and part of New Jersey. R. H. Hubbell, Jr. is president of the new firm. Other officers include Warren E. Sawyer, Jr., vice president, secretary and treasurer, and R. A. Hogan, sales manager.

The firm has established its main headquarters at 210 W. Washington Square, Philadelphia. All sales will be handled by the New York City office at No. 1 Wall Street. Waverly Petroleum Products Co., Philadelphia, will continue as distributor for both Speedi-Dri and Sol Speedi-Dri in western Pennsylvania, the South, the Middle West, West, and Southwest.

#### William E. O'Connor

William E. O'Connor of Philadelphia, Pa., for 42 years associated with The Cleveland Automatic Machine Co., Cincinnati, Ohio, died recently following a heart attack at the age of 75 years. Mr. O'Connor was born in Manchester, England and came to Chesterville, Ontario, Canada as a boy. After completing schooling at Chesterville, he came to the United States in 1895.

In 1906 Mr. O'Connor became associated with The



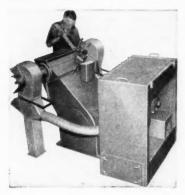
William E. O'Connor

Cleveland Automatic Machine Company, which at that time was located in Cleveland, Ohio, after working several years in Chicago, Illinois, for a manufacturer of bicycles. His first assignment with Cleveland Automatic was in the testing department where he had such unusual ability as a mechanic and tester that he was soon promoted to the position of service engineer for Cleveland Automatic's New York territory, a position which he held until the time of his retirement in October 1947.

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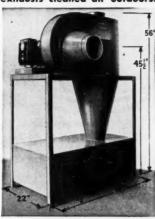
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#### Did You Know?---

Alexander Nimick, Sr., works manager of the Colonial Steel Division of Vanadium-Alloys Steel Co., Latrobe, Pa., died recently after an association of 35 years with Colonial Steel.

-- 0 --

Bernard Lester, long active in the Machine Tool Refresher Course and originator of the Westinghouse Machine Tool Forum, John A. Silver and Frank W. Hankins have announced the formation of the management engineering firm of Lester, Hankins and Silver. Specializing in the management, distribution and sales problems of manufacturers and distributors of machinery, equipment and technical products, the company has offices at 1605 Race Street, Philadelphia and 140 Cedar Street, New York.

Hauser Machine Tool Corp., 30 Park Ave., Manhasset, L. I., N. Y., has been appointed exclusive United States factory representative for S. Lambert, S. A., Solothurn (Soleure), Switzerland, manufacturer of gear generating and hobbing machines, wheel cutting machines, and plate facing and recessing machines.



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J. C. Stites has been appointed assistant manager of sales and export sales manager of The Cleveland Twist Drill Co., Cleveland 14, Ohio. Formerly with the company's field sales division, Mr. Stites is taking over the position formerly held by H. P. Jenson, who died recently. R. O. Artner, formerly manager of the company's Detroit stockroom, has been promoted to the field sales division.

John W. Jessen, 417 East "C" St., Iron Mountain, Mich., has been appointed representative in the Upper Peninsula to handle drill jig bushings, steel stamps, and marking devices as produced by Colonial Bushings, Inc., Box 37, Harper Station, Detroit 13, and New Method Steel Stamps, Inc., 149 Jos. Campau. Detroit 7, Michigan.

Ben Sloan, Newark, New Jersey representative of Pratt & Whitney for 30 years. died recently after establishing a record of over 42 years of continuous service with the organization.

-0-

Union Twist Drill Co., Athol, Mass., manufacturer of carbide, carbon and high speed steel cutting tools, has announced the appointment of Machinists Tools Inc., 854 Main St., Buffalo, N. Y., as its distributor in Buffalo and surrounding territory.

Edward H. Roos, with 25 years of experience in production and factory management in the East, has been appointed factory manager of the C. A. Norgren Co., Denver, Colorado.

-0-

Pope Machinery Corp., 261 River St., Haverhill, Mass., has named Arthur J. Renz as field engineer on precision spindle applications. -- 0 --

Frank D. Mumford has been appointed parts sales manager of the E. W. Bliss Company, manufacturer of stamping presses, rolling mills, and container machinery. - 0 -

Mathews Dick, Jr., formerly with the International Harvester Company, has been appointed sales engineer in the Chicago area by the Butterfield Division of Union Twist Drill Co., Derby Line, Vt., manufacturer of taps, dies, reamers, and special metal cutting tools.

#### Did You Know?---

Spencer R. Griffiths, formerly associated with Joseph T. Ryerson & Son, Inc., in charge of stainless steel sales in the midwest district, has been appointed assistant sales manager of Unistrut Products Co., 1013 W. Washington Blvd., Chicago 7, Illinois.

The F. H. Harris Co., 340 Main St., Worcester 8, Mass., has been appointed service and sales representative on gear cutting and finishing machines, gear cutting tools, and gear checking equipment made by the Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Michigan.

The automatic air-hydraulic drill head formerly manufactured by the Cleveland Republic Tool Corp., Cleveland, Ohio, has been acquired by the Rockwell Mfg. Co., Delta Mfg. Div., Milwaukee 1, Wis., as an addition to its line of Delta-Milwaukee power tools.

The Elastic Stop Nut Corporation of America, Union, N. J., has appointed Donald B. Sorenson as sales engineer in charge of the Wisconsin and Minnesota area. The Ready Tool Co., Bridgeport, Conn., has recently acquired all the patent, manufacturing, and sales rights of the Barter-Ritco reversible grinder dog formerly manufactured by the Rhode Island Tool Co., Providence, R. I. Machinery and equipment for the manufacture of this dog will be transferred to the Ready plant in Bridgeport.

Announcement has been made of the acquisition of the controlling interest of the 82-year old Ottumwa Iron Works, Ottumwa, Iowa, by Lou Mervis, industrialist and present head of the Pittsburgh Gear Co., Pittsburgh, Pennsylvania.

F. H. Harris Co., 340 Main St., Worcester 8, Mass., has been appointed New England service and sales representative for the broaches, broaching machines, hydraulic presses, and other equipment produced by the Colonial Broach Co., Detroit 13, Mich. Harris will also handle drill jig bushings, steel stamps, and marking devices produced respectively by Colonial Bushings, Inc., Detroit 13, and New Method Steel Stamps, Inc., Detroit 7, in the territory including Vermont, New Hampshire, Maine, Massachusetts, and Rhode Island.

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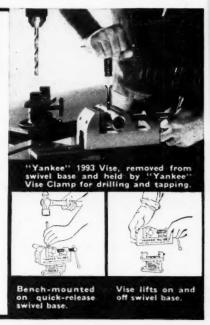
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# National Machine Tool Builders Elect New Officers At Annual Meeting

R. W. Glasner

DAVID AYR, president and general manager of the Hendey Machine Company, Torrington, Conn., is the new president of The National Machine Tool Builders' Association, following his election at its 48th Annual Meeting at Hotel Greenburg.

Richard E. LeBlond, president of The R. K. LeBlond Machine Tool Company, Cincinnati, Ohio, and Frederick S. Blackall, Jr., president of The Taft-Peirce Manufacturing Company, Woonsocket, R. I., were elected first and second vice presidents, respectively.

Jerome A. Raterman, president of The Monarch Machine Tool Company, Sidney, Ohio, was elected treasurer. Tell Berna continues as general manager and Mrs. Frida F. Selbert was again named secretary.

Three new directors were also elected. They are Mr. Blackall, Mr. Raterman and R. W. Glasner, president of the Clearing Machine Corporation, Chicago, Ill. They will serve three year terms.

Mr. Ayr received his early training at

Brown & Sharpe Manufacturing Company, Providence, R. I. Later he was associated with the Pierce-Arrow Motor Car Company at Buffalo, and in 1924, with the Pratt and Whitney Division of Niles-Bement-Pond Company as works manager. He was elected president and general manager of The Hendey Machine Company in 1932, which position he now holds.

A new formula for weeding out obsolete machine tools in metal-working plants throughout the country was presented at the meeting by L. W. Scott Alter, president of The American Tool Works Company. Urging a virtual national roundup of obsolete equipment, for replacement with new machines according to rules which make "financial sense", Mr. Alter emphasized that "it is in the interest of everybody" that withdrawal of such equipment be encouraged. He stressed that outmoded ideas of "horse trading" equipment policies, based on replacement of "machine by machine" were the "least desirable" ways

to encourage modernization of factories. Instead, "a far better approach is on an over-all basis." Mr. Alter's plan calls for a "plant equipment ledger" with a standing in financial accounting equal to any company's "portfolio of securities."

any company's "portfolio of securities." A. G. Bryant, chairman of the Government Relations C o m mittee of the NMTBA charged that American industry is not as strong relatively as it was before the war and recommended an American Recovery Program. Mr. Bryant, who is vice president of the Cleereman Machine Tool Company and president of The Bryant Machinery and Engineering Company, asserted that our industrial plant has stagnated since the end of the war and that the "creeping paralysis of inefficiency eventually will lead to the undermining of our standard of living." He proposed an American Recovery Program based upon the following three points.

1. Guide every step of our foreign policy along roads that will require our aid to be used in the establishment abroad only of those industries that will utilize available local resources to best advantage and will not merely duplicate facilities that already exist in this country and are ample to supply world requirements.

 Stimulate the rehabilitation of the American industrial plant, which, although the best in the world, has been allowed to deteriorate by failing to replace its outmoded prewar machinery with postwar designs.

 Substitute in Government a constructive attitude of reassurance to industry that efficiency and wellearned profits are to be encouraged, in place of current policies which penalize progressive management and cast uncertainties in the path of venture capital.

#### Name Plate Stamping Service

Facilities for the production of die stamped name plates for product identification, company trade marks, brand names, slogans, and so on, have been announced by the Federal Tool & Mfg. Co., 3620 Alabama Ave., Minneapolis 16, Minn. Name plates can be made to customer specifications in sizes up to 9 x 12 inches and of any metal up to 3/32 inch thick, providing it can be stamped.

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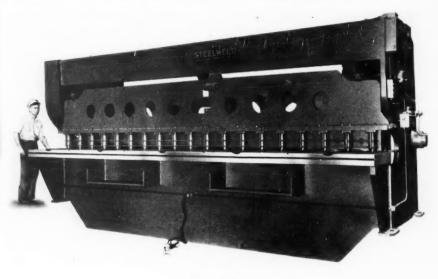


#### Shearing Machine

Said to be the longest Steelweld Shear built to date, the machine shown herewith, product of The Cleveland Crane & Engineering Co., 6401 E. 282nd St., Wickliffe, Ohio, has a capacity for shearing 18 feet of  $\frac{\pi}{3\pi}$ -inch mild steel at 50 strokes per minute and operates on the pivoted-blade principle in which the blade travels in a circular path without the use of guides and slides.

Ball bearing transfers are provided in the bed of the machine to facilitate movement of steel through the knives. A motor-operated back gage with slow and fast control buttons located conveniently at middle front of the machine enables the material to be cut to be accurately positioned. An oblong slot in the holdown beam permits the back gage indicator to be readily seen by the operator without having to walk to the end or rear of the shear. The indicator is graduated to read in inches and hts.

The shearing action is controlled by an electrically-operated foot switch which



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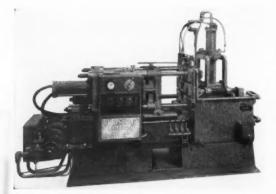
- Chicago 50, 2100 South 52nd Avenue
- Cleveland 14, 1550 East 33rd Street
- Dayton 2, 990 East Monument Avenue
- Detroit 16, 1549 Temple Avenue " Grand Rapids, 113 Michigan Street, N.W.
- \* Long Island City 1, 47.28 37th Street
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Cleveland Model 50 Die Casting Machine

ing aluminum castings up to  $2\frac{1}{2}$  lb. and zinc castings up to 4 lb., the machine can be supplied with either automatic or manual control and has die plates which are  $22 \times 18$  inches and four tie bars which are 2 inches in diameter. The space between the tie bars is  $16 \times 12$  inches, and the die opening is 8 inches. An estimated 50-ton locking pressure is said to be obtained through a toggle mechanism.

can be moved about the floor to the convenience of the operator. The frame and blade are of all-welded steel, one-piece construction with the heavy bed extending below the floor. The bed and crown are welded to the end housings, thus forming an integral unit having unusual strengths. Knife clearance can be readily adjusted to suit the thickness of plate being cut by simply turning a convenient handcrank and observing a large dial indicator.

#### Die Casting Machine

The Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio, has announced a high pressure hydraulic die

casting machine, designated as the Model 50, which can be furnished either as a cold chamber unit for casting aluminum or as a gooseneck type of machine for casting zinc, tin, or lead. The one-shot end can be easily removed and changed to the other type end if desired.

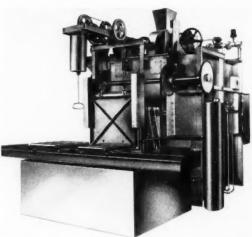
The machine is equipped with a Vickers two-stage pump driven by a 10 h.p. direct connected motor. The pump is designed to deliver 43 g.p.m. at the low pressure stage and 10½ g.p.m. at the high pressure or 500 p.s.i. stage. The hydraulic system also includes Vickers oil filters, a heat exchanger, and a 79-gallon capacity oil reservoir.

Said to be capable of produc-

#### Batch Type Furnace

Surface Combustion Corp., Toledo 1, Ohio, has developed a batch type radiant tube fired furnace designed for clean hardening, gas carburizing, dry cyaniding, and other controlled atmosphere heat treatments. Work is moved in and out of the furnace on four trays which are actuated by alloy screws. A lowerator quench mechanism is included which provides "semi-automatic" operation for the charging and discharging of the furnace.

Extremely fast heating rates developed by the use of radiant tube firing, combined with a fan to circulate heated, prepared atmosphere, are said to provide for the heat treatment of up to 200 lb. per hour gross loads per square foot of area. The furnace has a maximum gross



"Surface" Batch Type Radiant Tube Fired Furnace



SATIN CHROME FINISH. Pioneered by Starrett. Now on thimble and sleeve of all micrometers— on the frame of all full finish models. Nonreflecting, eliminates glare, markings stand out sharp and clear, resists rust and stains, increases speed and accuracy.

TAPERED FRAME. Easier to measure in narrow slots and tight places. Standard on all full fin-

ish outside micrometers. HI-MICRO FINISH on contact faces of anvils and spindles for more accurate measurements. This mirror-like finish insures better parallelism

of contacts with longer life and less wear.

HARDENED THREADS. Micrometer screw hardened, stabilized and threads ground from the solid for lasting accuracy.

ONE PIECE SPINDLE. Insures long, accurate

QUICK READING FIGURES. Every graduation on the thimble numbered for quick, error-proof reading.

DECIMAL EQUIVALENTS of 8ths, 16ths, 32nds and 64ths conveniently marked on frame or thimble.

SLEEVE ADJUSTMENT. Simple adjustment of sleeve maintains Starrett accuracy at all times. FRICTION THIMBLE. Friction stop mechanism in the thimble "right under your thumb" available if desired. Also available with ratchet stop at end of thimble.

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of precision micrometers. For complete information see your Starrett Distributor or write for FREE Starrett Catalog No. 26 "MD" and New Satin Chrome Micrometer Folder.

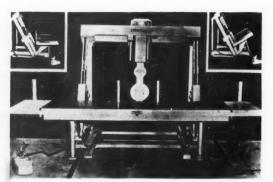


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Lyon-Raymond Adjustable Tilt Hydraulic Sheet Feeding Table

which first tilts the platform until it is at a right angle to the

charge capacity of up to 2,500 lb., depending upon the type of work to be processed. With the RX atmosphere generator built integrally with the furnace unit, a 16-foot long x 9-foot wide space is said to be adequate for the entire furnace.

carriage channels and then elevates it. Backstops are fixed at right angles to the table top so that they will support the load in the tilted position without binding the top sheets.

Frame and carriage members are hinged. Three simple ad-

Frame and carriage members are hinged. Three simple adjustments predetermine the amount of incline at which the platform elevates and the low-

ered height of the platform. Screws in the feet of the rear upright supports govern the degree of incline assumed by the carriage channels. The lowered height of the leveled platform is regulated by movable stops on the carriage channels and adjustable legs on the platform carriage.

#### Hydraulic Sheet Feeding Table

For raising up to 6,000-lb. loads of steel sheets and positioning the top sheet for feeding to an inclined press, the Lyon-Raymond Corp., 22553 Madison St., Greene, N. Y., has developed a stationary type table having an elevating platform 30 inches wide x 90 inches long. Two 15-inch end extensions are provided to increase the length of the platform to 120 inches. In the lowered position, the platform is level to facilitate loading. As an hydraulic foot pump is actuated, the platform first tilts and then elevates at an

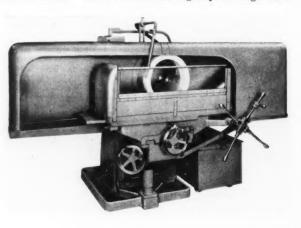
angle to position the top sheet to the press. Operating the foot pump as required is said to keep the top sheet always in feeding position until the entire pile is used.

The elevating mechanism consists of an inverted ram, chain sprockets, and roller chain extending from a holst to the elevating platform. In operation, the ram forces the sprocket bracket down, thus increasing the tension on the chain

#### Face Grinder

A face grinder with motorized spindle and 18-inch wheel has been announced by the Abrasive Machine Tool Co., East Providence 14, R. I. The 15 h.p., 900 r.p.m. motorized spindle is said to provide for the elimination of all pulleys and belts and to afford an unusually powerful drive. The spindle is mounted on preloaded ball bearings to ensure long life and chatter-free operation.

The grinder includes box-type ways to assure maximum rigidity. A large work



Abrasive 18-Inch Wheel Face Grinder

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surface of 13 x 36 inches permits the use of the machine for practically every face grinding application where flat, square surfaces are required. Standard equipment of the unit includes complete coolant equipment with 60-gallon tank and unique table water-guards.

#### Vertical Jig Borer

Said to be the largest vertical type jig borer ever built, the P & W No. 4-E Jig Borer illustrated herewith, product of Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn., is claimed to be capable of locating and boring to 0.0001-inch accuracy with a work load of 2½ tons. The 15-ton machine with its open-side construction provides convenience in placing and holding a wide range of work.

The No. 4-E has a 36 x 72-inch rectangular table with longitudinal travel of 60 inches and transverse travel of 36 inches. The maximum standard height from table top to spindle nose is 33 inches; however, columns 6, 10, and 14 inches higher than standard can be furnished, increasing the vertical capacity to a maximum of 47 inches. A combination rectangular and built-in 42-inch diameter rotary table or a

built-in 48-inch rotary table can be furnished in place of the plain rectangular table.

Tools as large as No. 5 Morse taper may be held in the spindle with collets and a spindle nose cap. The 51/2-inch diameter hardened. ground and lapped quill has a 10-inch vertical travel with power feeds (both up and down) ranging from 0.0005 to 0.015 inch per revolution of the spindle. An adjustable dial indicator depth gage with positive stop is built into the spindle head for accurate boring to depth.

Electrical controls of the primary functions of the machine are concentratedina pendent control which is located at the normal operating position and adjustable to suit operating conditions. Push-button controls and selector switches are provided for spindle motor speed selection; spindle start, stop and reverse; spindle clutch and brake: spindle head (verti-

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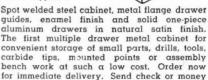
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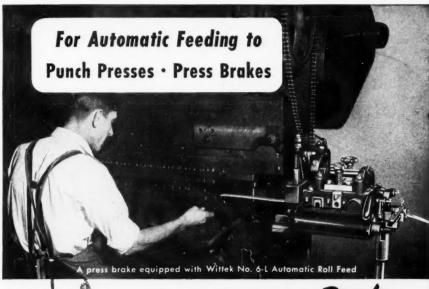
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Wittek Roll Feeds are made in standard models to meet every requirement in the automatic feeding of strip stock to punch presses or press brakes. The distinguishing feature is their simple and economical method of operation which does away with complicated parts thereby assuring speed and accuracy in the feeding of various kinds and thicknesses of material.

Wittek Adjustable Reel Stands are designed as companion units to Wittek Automatic Roll Feeds and are available in seven different models to handle ALL types of coiled strip stock and wire being fed to punch presses or similar production machinery.

Special units of Wittek Automatic Roll Feeds and Adjustable Reel Stands are engineered to meet unusual requirements.

Write for complete descriptive literature

WITTEK Manufacturing Co.

4322 W. 24th Place Chicago 23, III.



cal power movement with automatic clamping and unclamping); longitudinal rapid power travel of table for quick positioning; and carriage and table power feed selection from 1 to 15 inches per minute. In addition to the controls on the pendent box, push buttons are also located on both carriage and table control brackets for controlling rapid power travel when positioning the work in both longitudinal and transverse directions.

An electric control cabinet located at the right of the machine contains a main disconnect switch, all starters, relays, electronic and other electrical apparatus

# MILL IT ON YOUR LATHE PALMGREN MILLING ATTACHMENT Convert Lathe in 10 Seconds Mill, slot, grind, groove, square shafts, recess—on lathe. Shops,

schools, homes need this fixture. Fits Craftsman, Atlas, So. Bend, Logan, Sheldon, Perkins. Accurately graduated for rotary and vertical feed. No. 150, 11/2" Jaw \$18.75; No. 250, 21/2" Jaw \$24.75; No. 400, 250 4" Jaw \$39.75.

CHICAGO TOOL and ENGINEERING CO. 8399 South Chicago Ave. Chicago 17, Ill.

#### T. H. LEWTHWAITE MACHINE CO.



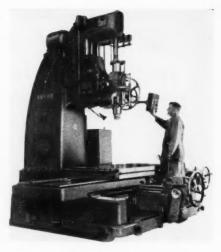
FRONT LEVER BENCH PUNCH

Capacity 7/16" hole through 1/4" steel or equal

Round, square, flat, and oval shaped punches and dies stocked

Send for circular illustrating and describing this machine.

317 East 47th St., New York 17



P&W No. 4-E lig Borer

necessary to the operation of the machine. The floor space occupied by the entire machine and control cabinet is approximately 12½ feet wide x 11 feet deep. The approximate overall height of the machine (using highest column) is 12 feet.

#### Machine Tool for Pipe Flanges

For boring, reaming, threading, and counterboring cast iron pipe flanges on a high production basis, Baker Brothers, Inc., Toledo 10, Ohio, is offering the Baker 30HO4 Machine illustrated herewith, which is equipped with a three-jaw scroll and chuck and is designed to handle all sizes of flanges from 3 to 16-inch pipe size. Murchey special full receding

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REAMERS IN Decimal SIZES

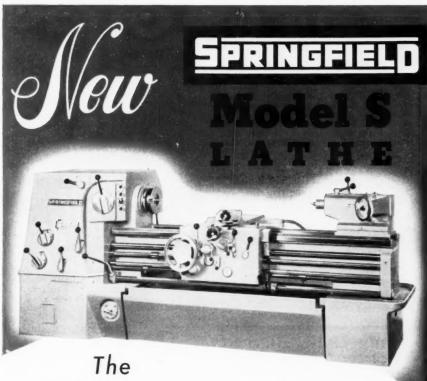
▼ 470 individual sizes carried in stock in variations of .001 from .032, .033, .034, .035, .036, etc., all the way up to .501; Any size required larger than .501 . . . blanks can be ground to your exacting specifications, delivered in 3 or 4 days. By purchasing SUPEREAM Reamers in steps of .001 you SAVE time, labor and money in the cost of extra machining and lapping. SUPEREAM Reamers all have ground and polished flutes and are held within .0002 tolerance.

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Reamers are also furnished in Righthand spiral, Right-hand cut, as well as Left-hand spiral, Right-hand cut. These specials are delivered in 3 to 4 days. TWENTIETH CENTURY



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pipe taps with quick-change chasers and reamer blades are used to perform the boring, reaming, threading, and counterboring operations in rapid succession. The machine has a worm and worm gear drive head and is arranged with sliding gears providing two speeds, plus pick-off speed change gears.

The operating cycle of the machine is as follows (1) The saddle is rapid advanced through hydraulic pressure to a predetermined point where the taper reaming operation begins. (The cycle is controlled through limit switches.) (2) Half nut closes, providing positive lead

> SOMERSET Radius Dresser SAVES TIME Thousands of Somerset Dressers in service. Offer outstanding teatures Wheel is dressed from below, avoids removal of guard. Stop pins permit rotation thru 180° or 90°

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bearing is dustproof.



Baker 30HO4 Machine for Pipe Flanges

screw feed of the saddle for reaming, tapping, and counterboring operations. (3) At the completion of operations, the

half nut opens and the saddle is rapidly returned to raised position by hydraulic pressure.

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  All parts fully enclosed for
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Here's a versatile tool which permits you to take advantage of a wide range of adjustment - without overhang. Supplied with 3 spindles for equal adjustment in line and 3, 4, 5 or 6 spindles for equal adjustment on bolt circles.

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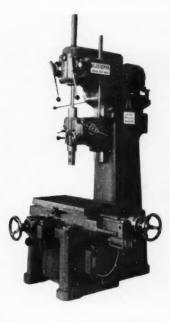
Main Office and Plant: STATEN ISLAND 4, NEW YORK

#### Layout Drilling Machine

For maximum convenience in performing drilling, boring, tapping, reaming, milling, and similar operations, the Cleereman Machine Tool Co., Green Bay, Wis., is offering the layout drilling ma-chine illustrated herewith. The machine is said to be especially applicable to tool work, die casting molds, and blanking, punching, forming, and drawing dies within its designated limits, as well as experimental work and small-lot manufacturing.



The unit features a combination boring and drilling spindle having a No. 4 Morse taper with lifetime lubrication. Preloaded ball bearings are used at the nose end with an upper steadying ball bearing and a coupling type connection provided between the spline shaft and the spindle in the top of the quill. The spindle quill is chrome plated, and the rack is ½ pitch. The tang slot has a hardened steel insert. A spindle binder on the sliding head



Cleereman Layout Drilling Machine

and a retaining key slot in the spindle provide for milling operations. The sliding head has a friction type feed clutch with automatic adjustable depth "kickout," and the spindle is counter-balanced in a unique manner that is said to eliminate backlash between the spindle feed rack and pinion.

The movements of the saddle and table are controlled by hardened and ground precision lead screws with 6-inch diameter micrometer dials graduated to 0.001 inch and verniers of 0.0001 inch. Additional standard features include reference scales graduated to eighths and having adjustable pointers for quick, convenient reference, and "one-shot" lubricating system for the table, saddle, and bed

# WILLEY'S TUNGSTEN CARBIDE TOOLS

- Standard cutting tools, in complete range of sizes.
   Standard and special tips. Tipped boring and roller turning tools.
- Solid tungsten carbide reamers.
   Tipped reamers.
   Shell reamers.
   Shell reamers.
- Tipped twist drills. Solid tungsten carbide drills.
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As America's largest independent producer of tungsten carbide metal we are well equipped with long experience, engineering skill and superb plant facilities to produce tools that meet the most exacting requirements of modern production methods.

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#### WILLEY'S CARBIDE TOOL COMPANY

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mechanism. Power rapid traverse to table movements is an optional feature, with automatic safety stops provided at the extremes of travel.

#### Shearing Die Attachment

Diamond Machine Tool Co., 3429 E. Olympic Blvd., Los Angeles 23, Calif., has announced a shearing die attachment to be used for shearing applications in Diamond "Multi-Max" punch presses. With the attachment, a Model 3048 Multi-Max punch press is said to be easily converted



Shearing Die Attachment for Diamond
"Multi-Max" Punch Presses

into a 10-gauge 48-inch power squaring shear in approximately 15 minutes.

The shearing die attachment is equipped with adjustable front and back gauges which are of identical design as

used on Diamond power squaring shears. Holddowns are of onepiece construction, stripper type spring loaded. The attachment utilizes alloy steel blades which have four cutting edges and are heat treated and ground to extreme accuracy. The attachment is mounted in an allsteel die set with two 2-inch diameter hardened and ground leader pins. Cutting length is 48 inches and cutting thickness is 10 gauge. Slope per foot of blade is % inch. Back and front gauges each have a maximum range of 24 inches. The net weight of the attachment is 1,075 pounds.



LOWEST COST PRECISION. When mounted on standard machine tools, PRECISE SUPER 40 at speeds from 20,000 to 45,000 R. P. M. turns out precision jobs heretofore possible only on stationary machines costing up to 100 times as much.

VERSATILITY. For cylindrical, internal, external and form grinding; for milling with H.S. steel or tungsten carbide midget mills; for microfinishing and polishing. Use on wood, glass, rubber, plastics, or any metal including the hardest alloy steel.

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ATTACHABLE COOLFLEX SHAFT. (optional) Quickly attached for bench work and handteol applications. Same speeds, same precision quill as in PRECISE SUPER 40.

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Milling hardened die with tungsten carbide mill in COOLFLEX ATTACHMENT.

Internal grinding on lathe with

PRECISE wheel arbor mounting

11 D. wheel.

PRECISE PRODUCTS CO., 1345 Clark St., Racine, Wis.

PRECISE SUPER 40

#### Belt Grinder

Known as the "Expeditor," a belt grinder which can be set at any desired angle has been announced by Harvey L. Ramsay & Co., 636 S. 10th St., La Grange, Ill. The unit is mounted on an axis that centers at the motor shaft, and, with one turn of a



"Expeditor" Belt Grinder in Use

of a clamp nut, the abrasive belt can be set at any required angle.

If desired, several Expeditors can be set above each other so that the contact wheels or platens of the units may be directly in front of the operator. In this setup, the operator can rough, semifinish, and finish grind with little movement. The grinder can also be used alongside of milling machines, band saws, hack

saws, automatics, and other machine tools for deburring workpieces, removing cutter tool, or saw marks, breaking corners, rounding out contours, and other clean-up operations.

The Expeditor is designed for free belt operation, form wheel work or contour grinding, line contact grinding, and platen precision grinding, either above or below. The unit includes a front contact roll made of aluminum and a drive belt that serves as a resilient or cushion.

#### Press-Broach

Bearing the designation KRW, an hydraulically operated combination pressbroach designed for "push-pull" operation in either a vertical or horizontal plane has been made available in 25, 50, and 60-ton capacities by K. R. Wilson, 215 Main St., Buffalo 3, N. Y. When used as a broaching machine, tonnages can be varied from one ton to the capacity of the unit. The ram stroke range varies from 7 to 54 inches. Ram speeds and maximum tonnage pressures depend on the type and capacity of the motor and hydraulic pump equipment supplied of which there are ten units from which to choose.

The pressure gage, located at eye level,



OUR fine list of Customers is PROOF that our method of broaching square holes makes a better fit for the tool bit. This means more rigidity and longer life especially with tungsten Carbide. We also make bars for our Type B and Type C cutters or a combination of tool bits and cutters. Bars are made to suit customers' requirements as to method of drive, pilot, number of holes, angle of bit, etc. Our two-bladed cutters can be floated in the bar or held rigidly. Cutters are interchangeable—hence can be ground in an arbor in the tool room and only require a few seconds for inserting in the bar.

Square hole sizes range from ¼' up to and including ¾'.

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1927

#### TYPE "B" AND "C" CUTTERS

Suitable for Tipping With Tungsten Carbide



"B": A strong rigid serrated 2-bladed cutter—located in the bar with a taper pin. Bores holes accurately to close limits. Can be expanded and reground giving long life. Sizes ½" dia. up to 6".



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FORD CARBIDE CUTTER

#### CARBIDE ROTARY CUTTERS -MACHINE GROUND

For filing, grinding and finishing, burring, countersinking and chamfering, light milling, profiling, tool, die and mold machining, Ford carbide cutters will do a better job in less time at a lower cost—and without a major capital investment. Send for Bulletin C-549—Sizes and Specifications.

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is equipped with a pressure dampener to prevent damage resulting from sudden pressure stops. A pressure regulating valve permits the selection of any desired pressure within rated capacity. A manually operated four-way valve provides for instant and precise finger-tip control of the ram. The hydraulic system includes a 20-gallon capacity reservoir from which the hydraulic fluid is distri-



KRW Combination Press-Broach

buted through seamless steel tubing. The pumping unit may be located either in the base or at the top of the machine. Al! electrical controls are standard. Cutting oil is supplied through an independently motorized coolant pump from a 15-gallon reservoir.

For push broaching, an adapter is screwed into the upper cross bar, the broach is inserted and held by a slot and key. For pull broaching, a similar adapter is inserted in the lower cross bar. A flat nosed adapter is furnished for attachment to the upper cross bar to allow for the handling of many types of pressing and forming jobs.

#### Adhesive

A thermosetting resin compound for joining metals and numerous other rigid materials to themselves and to each other is now being manufactured under the name of Armstrong's Adhesive A-1 by the Armstrong Products Co., 387 N. Broadway, Burket, Ind. The compound, it is claimed, contains no volatile solvent, does not shrink or swell upon hardening, sets up to a rigid solid, and becomes the adhesive bond between the materials to which it is applied. Since the adhesive contains no volatile constituents, it can

be used as a gapfilling material and also enables materials that are to be bonded together to be assembled immediately after application of the compound.

According to the manufacturer, Armstrong's Adhesive A-1 has been used successfully to bond aluminum alloy spacers to steel discs in magnetic fluid clutches operating at temperatures as high as 200 deg. F.; to bond steel housings to steel in large bearings; to repair broken aluminum castings: and so on. The adhesive is available in pint, quart, gallon, and five-gallon contain-

#### Shape Cutting Machine

Designated as the Airco Monograph No. 3, a precision shape cutting machine for shops of all sizes is now being marketed by the Air Reduction Sales Co., 60 E. 42nd St.. New York 17, N. Y. The machine is said to cut any shape, within

a 56 x 32-inch area, that the operator can follow on a drawing, outline, or template. The tracer wheel is motor driven at any speed from 3 to 30 inches per minute and, on shape cutting, is manually guided.

Straight cuts up to 64 inches long can be made by the use of a grooved straightedge supplied with the machine. Lengthwise cuts longer than 56 inches can be handled by adding extra 80-inch lengths of tubular rail. Circles up to 32 inches in diameter may be cut automatically. A radius rod supplied with the



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Production was boosted from 52.000 pieces to 95.000 pieces per day. Maintenance charges were reduced and floor space requirements cut. Costs were permanently lowered and a better competitive position reached. This is what a manufacturer accomplished by replacing conventional equipment with our Hi-Speed Automatic Press.

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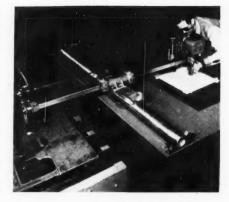
★Die designed and built in our modern tool room.

DI MACHINE CORP. 27/4 IRVING PARK ROAD, CHICAGO 18, ILL.



12 TON PRESS 45-300 STROKES PER MINUTE machine attaches to the tracer device and guides the cutting. Using a suitable tip, the machine is said to cut any ferrous metal in thicknesses up to 8 inches and to make bevel cuts at any angle up to 30 degrees.

All operating controls are conveniently centralized at the tracing end of the machine, which is supplied in a single carrying case complete with cutting torch and high speed tip, motor-driven manual tracing device, one 80-inch length of tubular rail, a 66-inch grooved straightedge for making straight cuts, a radius rod for cutting circles; 25 feet



Airco Monograph No. 3 Shape Cutting Machine in Use

#### M - D Facing Heads With Automatic Feed

Can be attached to Boring Mill Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse; feeds automatically. Sizes 6" to 46" diameter.

Write for circular.

MUMMERT - DIXON CO. HANOVER, PA 120 PHILADELPHIA ST.

of extension cord, and 25 feet of Airco-Twin Hose. According to the manufacturer, the machine is light enough to be easily carried by two men. The machine and rail together weigh 250 lb.; the machine itself weighs 110 lb. assembled.



All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

CUTTER SPECIALISTS SINCE 1919. Write today for prices. A few territories open.

QUALITY TOOL WORKS

WAUKEGAN ILLINOIS

#### Portable Honing Head

Known as the "Honall," a portable honing head for use with a portable drill. lathe, or drill press in sizing and finishing holes has been announced by the Sunnen Products Co., 7983 Manchester Ave., St. Louis 17, Mo. The head is recommended for generating round, straight holes with accuracy as desired (to one ten-thousandth of an inch) and with surface finish as fine as 2 micro-inches r.m.s. in hardened steel.

Designed for honing holes from 3/16 to 1 inch in all metals (except lead and babbitt), the Honall utilizes standard



#### WALTON THE FINEST TOOL FOR TAP EXTRACTOR REMOVING BROKEN TAPS

Removing broken taps need not call for the purchase of expensive equipment. Walton Tap Extractors have been used for years by toolmakers and mechanics all over the world. They are easy to use, fast, and economical.

Purchase from your dealer, or write us for Folder No. 10 and details of free trial oifer.

#### THE WALTON COMPANY

HARTFORD 10

CONNECTICUT



Sunnen "Honall" Portable Honing Head

Sunnen honing mandrels and may be employed for removing distortion after hardening or after assembly of parts; salvaging parts with defective holes; sizing and finishing dowel pin, header and elector pin holes and holes in extrusion

dies; making machine repairs without complete disassembly; and for many other sizing and finishing applications. It is said to be equally convenient for removing several thousandths of stock or only the "last tenth" for an exact fit.

#### Moisture Control Desiccants

Celler Engineering Associates, 115-21 Farmers Blvd., St. Albans 12, N. Y., has announced that Celler's Engineered Hydroscopic Desiccants are now being packaged for the manufacturer with small to medium size tool cribs or rooms and other locations requiring vapor and moisture control for the prevention of dampness, rust, mold, mildew, and corrosion on metals and other materials. The desiccants are in bead form and, it is claimed. do not disintegrate when used and show no dusting at any time.

Celler's Engineered Hydroscopic Desiccants are packaged in perforated aerated cans of various sizes for complete circulation of moisture-laden air in and around the container. This method of packaging is also said to eliminate the necessity of repackaging for use and the need of changing the package for reactivation and recovery.

#### Precision Box Fingers

The O'Neil-Irwin Mfg. Co., 306 Eighth Ave., Lake City, Minn., has announced that all of its "Di-Acro" brakes can

# WHITNEY METAL



#### WHITNEY-JENSEN

#### No. 455 ANGLE IRON COMBINATION

An unusually strong and compact unit for shearing, notching, and bending angle iron. Adaptable for on-the-job work or permanent mounting in the shop. Floor space required — 21-1/2" x 26".

Capacity — all sizes angle iron up to and including 2" x 2" x 1/4" Send for descriptive catalog.

WHITNEY METAL TOOL CO.

now be quickly converted into a precision box and pan brake by merely using a newly developed box finger bar in place of the solid top bar supplied with all standard Di-Acro brakes. The box finger bar contains fingers graduated in size so that they cover the entire box forming range from 1/2 inch to the maximum capacity of each model Di-Acro brake by 1/8-inch steps. All fingers are properly hardened. precision ground, and accurately mounted against a machined surface in a sturdy alloy casting which provides extreme rigidity over its entire length.

The rigid construction of the box finger



(Above)-"Di-Acro" Box Finger Brake with "Adjustomatic" Gage, (Below) — Open End Finger Mounted on "Di-Acro" Box Finger Brake

bar also allows full capacity forming over its entire length, thus enabling the bar to be used for a wide variety of opera-tions other than box forming. The bar can be readily mounted on all Di-Acro brakes now in use and is furnished complete with a new "Adjustomatic" box depth gage. Another accessory which can be mounted on the box finger bar is a special open end finger that allows for

the forming of triangular, square, and rectangular tubes, as well as other similar parts which entirely enclose the form-

#### STANDARD

#### TAPER

The high quality and accuracy of Standard Steel Specialty Taper Pins have won them wide acceptance. Milled from bar stock, straight to taper and to extremely close tolerances, these pins give 100% performance. The uniformity and accuracy of the pins saves valuable time at assembly, assuring you trouble free service.

Write for complete catalog giving information on taper pins, Woodruff keys, machine keys and machine racks.



BEAVER FALLS



#### A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long soughta more accurate and surprisingly faster way of transferring blind screw holes.



The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in 3" to 1" diameters. Send for price list.

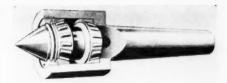
HEIMANN MFG. CO. 330 Lincoln Ave. Urbana, Ohio ing bar since the piece can be slipped off the open end of the finger when completed.

#### Live Center

Said to handle heavy loads at high speeds with extreme accuracy, a live center for lathes and other machines has been announced by Scully-Jones & Co., 1909 S. Rockwell St., Chicago 8, Ill. Available in Nos. 2, 3, 4, and 5 Morse taper sizes, the center features two matched standard Timken tapered roller bearings with eccentricity points aligned for accurate anti-friction rotation. Designed to

provide large bearing surfaces to withstand shock loads and abuse, the center is claimed to assure long life and high load carrying capacity (up to 1,000 lb. in the Nos. 2 and 3 Morse taper sizes and up to 2,400 lb. in the Nos. 4 and 5 Morse taper sizes). A threaded retainer ring for preloading bearings is said to provide for maximum rigidity as well as adjustment for wear.

The spindle of the unit is of alloy steel hardened to 64 Rockwell C. The point is ground in its own bearings after assembly to assure the holding of runout of within 0.0002 inch total indicator reading. The shank is induction hardened to provide for maximum strength and resistance to wear and is precision ground for an accurate fit. A heavy duty grease seal is incorporated in the threaded retainer ring. A rotating Neoprene ring is claimed to form an efficient labyrinth seal against



Scully-Jones Live Center

the entrance of grit or chips. A grease port with  $\frac{1}{26}$ -inch pipe thread is provided in the rear of the shank for a standard hydraulic grease fitting. This port

#### VESTERDAY'S PIONEER . . . TODAY'S LEADER



# WELDON

#### Stub Length Double-End End Mills

#### **NEW!**—Stock Items

A new line of small double-end end mills, with flutes shorter than regular, offer these advantages:

#### GREATER STRENGTH ● LONGER TOOL LIFF FAR LESS BREAKAGE ● FASTER FEEDS

Same high Weldon quality in 2- and 4-flute styles.

For complete list send for Folder No. STM-1



also allows for the insertion of threaded rod to rotate the spindle when redressing the point.

#### Press Numbering Assembly

A press assembly which is designed to permit the stamping of serial numbers and repeat markings simultaneously has been placed on the market by The Acromark Co., 9 Morrell St., Elizabeth 4, N. J. A combination slide style interchangeable type holder and consecutive action automatic numbering head makes up the

#### A Real Spring Winder!



Will earn its cost in one day. The Hjorth Perfection Spring Winder offers the

ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

No. 1 Capacity 0 thru 3/32" wire \$1.50 No. 2 Capacity 0 thru 3/16" wire \$3.00 No. 3 Capacity 0 thru 5/16" wire \$5.00

HJORTH LATHE & TOOL CO.

10 BEACON STREET WOBURN, MASS.

# Save MACHINE TOOL BEDS WITH





PO-RO Clamp Support Blocks

OLD WAY

 $1/2^{\prime\prime}$  to  $10^{\prime\prime}$  height (in  $1/16^{\prime\prime}$  adjustments) with one set of blocks.

HARDENED STEEL
TRUE FLAT SURFACES
SLIP-PROOF SERRATIONS

\$8.75

a set consisting of: 4 — No. 1 half blocks -1/2" to 1"

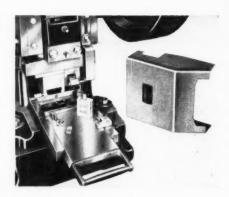
4 - No. 2 half blocks -

4 — No. 3 half blocks -

#### PODLIN TOOL CO.

3920 Wesley Terrace,

Schiller Park, III.



Acromark Press Numbering Assembly

upper portion of the assembly. The lower portion consists of a hand-operated slide that feeds name plates or flat parts underneath the stamping assembly. The hand slide is so constructed as to feed name plates or parts individually or, if the name plates or parts will stack and "push-off" from the bottom, the slide will feed them in sequence by having each plate push the preceding one from the bottom of the stack.

As illustrated, the unit requires hand placing of each individual plate onto the slide, however, a magazine can be readily added to permit stacking. The entire assembly is mounted in a standard die set for assembly in a precision power press that will deliver sufficient pressure for the marking. Length of stroke is 1 inch and die-set size is 7½ inches high with 1-inch diameter x 2-inch long shank. The width is 12 inches and the depth, 6 inches. The interchangeable type used is a heavy duty shoulder style that is held in the holder by a shoulder which increases the strength.

#### SAVE 90% CHECKING TIME

WHEN BUILDING DIES

This new method of checking tapers on dies does away with die squares and height gauges.

Write for complete

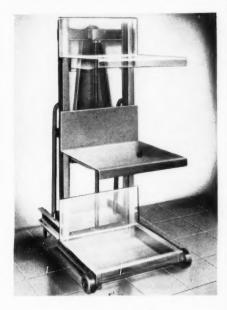
details.

TIETZMANN TOOL CORP.
318 N. Main St., Englewood, O.



#### Stacker

The stacker shown herewith is now being offered as a standard unit in the "Portelvator" line of lifting, positioning, and transporting equipment manufactured by The Hamilton Tool Co., \$28 S. 9th St., Hamilton, Ohio. It is of fabricated construction throughout and has a load capacity of 1,000 lb. The maximum height of platform surface from floor is 58 inches; minimum height, 6 inches. Ac-

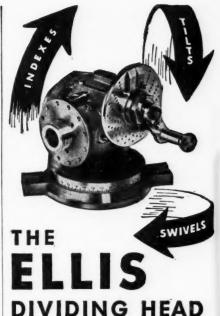


"Portelvator" Stacker

cording to the manufacturer, the platform automatically locks at any position stopped and cannot slip or "settle" under the load. The platform measures 26 inches from side to side and 24 inches from front edge to protective back plate.

Platform movement is accomplished through a handcrank, roller chain, meshing bevel gears, and screw. This method of power transmission is said to endow the platform with maximum rigidity and provide the operator with a full measure of safety. Provision is made for extra rapid platform movement under light loads.

The Portelvator Stacker is 70 inches high x 32 inches wide x 42 inches long overall and weighs 328 lb. It is equipped



Many unique features make the ELLIS Dividing Head more than an ordinary indexing fixture. It is a precise, rugged unit with 6½" normal swing increased to 11" swing through the use of riser blocks. It TILTS more than 100 degrees in the vertical plane—SWIVELS 360 degrees in the horizontal plane—INDEXES by crank, or directly by hand. Work is held between centers, or in chucks or collets. The ELLIS Dividing Head is a universal work head that will increase the production versatility of your milling machines, grinders, drill presses and its borers—write for complete details today.

SEE THE ELLIS AT THE APRIL A.S.T.E. SHOW



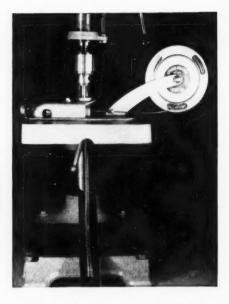
50-H CHURCH ST., NEW YORK 7, N. Y.

with ball bearing casters which are 4 inches in diameter x  $1\frac{1}{2}$ -inch face, and roller bearing wheels 5 inches in diameter x 2-inch face. A floor lock is standard equipment. Rubber-tired wheels and casters can be furnished if specified, and other special characteristics can be incorporated on order.

#### Spring-Making Attachment

Said to readily convert a ½-inch drill press into an efficient high speed springmaking machine, an attachment to be





Cycloid Standard Model "Spring-Master" Installed on Drill Press



known as the "Spring-Master" has been developed by the Cycloid Corp., 12 Newhall Ave., Saugus, Mass. The attachment can be obtained with three sizes of spindles with capacities for wire from 6 gauge (0.016 inch) to 28 gauge (0.071 inch). The outside diameter of finished springs can be made to vary from 3/16 to % inch. Special spindles can be provided for producing springs of other outside diameters.

The Spring-Master can be quickly set up on any standard ½-inch drill press by simply fastening it onto the drill press table with one bolt which extends through



one of the slots in the table. The same bolt holds the wire container in place. This container is designed to accommodate any 1-lb. standard package of wire.

An outstanding advantage of the Spring-Master is the fact that the pitch of springs being made can be infinitely varied to suit the application while the equipment is in operation. This is accomplished by simply moving the handle of the drill press up for an open pitch spring and down for a closed pitch spring. The length of springs is governed only by the length of wire used. The standard model

is furnished complete with two 1-lb. packages of spring

wire.

#### Work-Holding Tool

Known as the "In-R-Tool," work-holding device that can be readily used lathes, vises, boring mills, on machine tables and in fixtures, as well as in electric drills and drill presses, is now being manufactured by the Layne-Held Corp., 2005-K S. Shelby St., Higginsville, Mo. The inner pressure tool includes an arbor for a center member which is machined within accurate limits. Interchangeable cores and pressure members that fit the splines of the cores are provided. The cores cover a range from 11/4 to 23/4 inches and have N. C. 34-10 precision threads. A ratiolimiting collar controls distortion of thin work. This collar regulates the expansion of the pressure members which, in turn, hold the work firmly in place.

The In-R-Tool can be used as an expanding arbor when working between lathe centers or when inserted in chucks or collets. It can also be used to make thin spacers from plate. When used as an anchor, the tool acts as an inside self-centering chuck. In welding shops, the device can be employed to accurately align the interior and exterior of pipe and other objects to be joined.

Referring to the accompanying illustration, the short-work In-R-Tool shown in the foreground has a range of from 1½ to 2½ inches. The complete kit with all



De-Sta-Co Model No. 225-U clamps parts quickly with smooth, fast, powerful toggle action . . . holds them firmly in perfect alignment . . . releases rapidly. Features include stainless steel bearings, reamed working surfaces, compactness (1½" overall height in locked position). Cut fixture costs and increase your production with versatile De-Sta-Co Toggle Clamps. Mail coupon for complete information and name of nearest De-Sta-Co clamp distributors.

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For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheet, strips or parts . . . Shows up in sharp relief-dries instantly . . . Write for trial sample and circular.

MICHIGAN CHROME & CHEMICAL COMPANY 6340 E. Jefferson Ave. . Detroit 7, Mich.



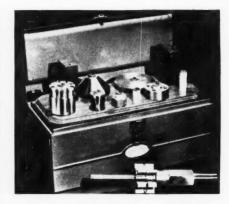


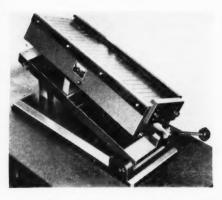
Illustration Showing Short-Work "In-R-Tool" (Foreground) and Complete "In-R-Tool" Kit

accessories covers a range from 11/4 to 23/4 inches. Special sizes of the tool can be obtained on order.

#### Magnetic Angle Plate

Designed for use on production-type surface grinders, the Robbins 20-Inch Series Magna-Sine shown herewith, product of the Omer E. Robbins Co., 5722 Twelfth St., Detroit 7, Mich., has a permanent-magnet chuck measuring 7½ inches deep x 20½ inches long and can be used for either wet or dry grinding. With the Magna-Sine in closed position, it may be used as a conventional magnetic chuck for holding parallel work. For

Robbins 20-Inch Series Magna-Sine



angular jobs, either single angle or compound angle, the unit can be quickly and accurately set up with standard gage blocks by the sine bar method.

The Robbins 20-Inch Series Magna-Sine is sturdily built for production use and carefully machined and constructed for absolute angular accuracy.

#### Roll Forming Machine

Designated as the "Ardcor" Type H, a roll forming machine which is said to form, curve, emboss, and cut in one continuous operation is now being built in standard sizes to accommodate material up to 5 inches wide and 20 gauge thick by the American Roller Die Corp., 20504 St. Clair Ave., Cleveland 17, Ohio. Machines of larger sizes for material up to 50 inches wide and % inch thick may be supplied on order.

Molding, beading, metal roofing, automotive parts, tubing, weather stripping, and various other products may be formed on the Ardcor Type H, which is of outboard or overhung design with all-steel construction, including base and housings. The machine may be provided with any number of spindles for handling ma-

terial of various widths. Speed in feet per minute varies from 50 to 300.

A time-saving feature of the Type H is the method of adjusting the top spin-



"Ardcor" Type H Roll Forming Machine

dles. Two adjusting screws are provided for each top spindle, these screws being connected in such a manner that by turning either one of them the top spindle is raised or lowered, maintaining a parallel relationship with the bottom spindle. Precision ball bearings are employed

# + BLACK DIAMOND + PRECISION GRINDER for ALL SMALL DRILLS

FAMOUS FOR EFFICIENCY IN THOUSANDS OF SHOPS



Motor driven, these highly efficient BLACK DIAMOND GRINDERS are giving superb service in hundreds of large and small shops throughout the nation.

They produce quantities of perfectly sharpened small gauge and fractional drills, with lips of uniform length, correct angle and proper clearance for true, accurate drilling.

They also release skilled mechanics for more important work—because Anyone Can Operate a Black Diamond.

The Web Thinner, an important attachment, cares for the proper grinding of all types of Notched points . . . and the built-in Diamond Dresser keeps the grinding wheel always sharp cutting. Write for new built-tin today.

BLACK DIAMOND SAW & MACHINE WORKS, INC.

**45 NORTH AVENUE** 

NATICK, MASSACHUSETTS

throughout the machine, the bearings being provided with Alemite lubrication fittings. All of the roll spindles are chrome-nickel steel, hardened and ground. All gears are heat treated and are fully enclosed in the housings of the machine.

#### Corner Draw Press

The Vulcan Tool Co., 731 Lorain Ave., Dayton 10, Ohio, has announced the development of a "one-corner-at-a-time"

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Ask your jobber or dealer about the timesaving features of the HARPER LATHE CARRIAGE SPACER... or write for descriptive folder.

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"Vulcan-Draw" Corner Draw Press

hydraulic drawing press known as the "Vulcan-Draw." In operation, the flat sheet is placed in position (one corner) in the press and the operator steps on an actuating pedal. In the normal few seconds hydraulic cycle, the sheet is released with the corner completely drawn and finish sized. By rotating the sheet, the other corners can be formed with specified overall panel dimensions maintained

Since only one corner is dealt with at a time, various corner radii covering different styled panels can be fabricated in the same equipment. The tooling consists of a simple corner punch and die which can be changed at will and within a few minutes if a differently shaped corner is to be formed. Different panel sizes of the same style or product can be formed by the same die. Practically any radii and any size panel from 15 x 18 inches up to the maximum capacity of the press can be economically corner formed from the flat sheet as received from the steel mill source, it is claimed.



## COLD RIVETERS and AUTOMATIC STAKING MACHINES

This cold riveter (at right) is made in ten sizes to handle work from 1/64" to 2" diameter. Write for complete information.

For staking, riveting, eyeletting, burring, etc., this high speed staking machine (at left) will produce over 1000 pieces per hour. Adjustable hammer blow, easily and safely operated. Send Samples tor Demonstration Purposes.

HIGH SPEED HAMMER CO., INC.



#### Electrode for Steel

"Steel-Tectic," a high speed electrode for steel which is said to weld bead over bead without the need for removing slag, is now being marketed by the Eutectic Welding Alloys Corp., Dept. P, 40 Worth St., New York 13, N. Y. According to the manufacturer, the Arinch electrode can be used at as low as 50 amperes on thin steel without danger of burning through, yet for piecework production may be employed at high amperages as a thin depositing electrode with a very short arc.

Designed for use in a vertical, horizontal, or downward position, the electrode

utilizes a flux coating, designated as Eutectic Frigid-Arc, which is said to form a protective envelope around the weld area, thus permitting a spray deposit free of weakening oxides and inclusions.

#### Inside Slotter

A portable handoperated deep
throat inside slotter designed for
fast, accurate inside slotting and
punch operations
has been introduced by the Beverly
Shear Mfg. Co.,
3000 W, 111th St.,
Chicago 43, III. The
unit has a shearing
capacity for mild
steel up to 16
gauge.

The slotter utilizes a unique punch and die arrangement of five high carbon, high chromium cutting blades. The four lower blades, arranged in a rectangular shape to form a die, provide maximum support for the shearing action of the fifth or upper blade as it is brought down through the metal and into the cavity formed by the lower blades. All five blades are adjustable to compensate for wear and various thicknesses of metal being cut. A slot 2½ inches long x ½ inch wide can be cut at one stroke of the unit. An upper blade for cutting a slot ½ inch wide is available on special order. If desired, a continuous cut, during which the work may be pivoted at any point of the stroke, can be made on the unit. The point of the 2½-inch long upper blade is 8 inches from the throat, thus enabling an inside cut of up to 10½ inches long to be made.

Rigidly constructed of lightweight high

# Improved Tap Head Makes TAPS LAST LONGER!

The unique triction clutch on this new, improved Procunier high speed tapping head practically "thinks" for the operator... making taps last longer, cutting production time and cost. This double-cone clutch engages the drive and reverse shells with a velvety "cushioned" action. Tap driving power is automatically regulated by the amount of pressure applied to it. "Blind" tapping is done as easily as through tapping. The operator can quickly detect dull or "loaded" taps just by the pressure needed to drive them. This increased sensitivity and smoothness results in: fewer broken taps; less operator skill ineeded, faster, lower cost tapping This improved Procunier tapping head has many more time and money saving features. Write today.

#### Procunier Safety Chuck Company

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PROCUNIER SAFETY CHUCK CO. 12 S. Clinton St., Chicago 6, III.

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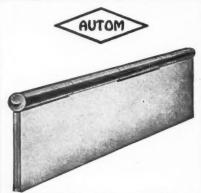
Please send your illustrated brochures which give complete prices and specifications on Procunier High Speed Tapping Heads and Machines.

Name
Address
City Zone State....



#### PROCUNIER "TAP SAVER"

Exclusive "Tru - Grip" tap holder, lighter, smoller in diameter, minimizes "flywheel" effect. It affords easier tapping close to walls or shoulders, eliminates "chewed up" tap shanks.



#### CONTINUOUS HINGES

Manufactured by

#### AUTO MOULDING & MFG. CO.

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#### **Cut Boring Costs**



#### **Blind Hole Bottoming**

Many enthusiastic users report that the Behr Boring Bar actually pays for itself in the first four weeks of operation. Just ask the man who uses one.

This proven patented bar is chatter proof, extremely accurate and ultra efficient. Has interchangeable blades and accessories.

It is unequalled for versatility and efficiency.



Can you afford not to get the facts? WRITE FOR CATALOG TODAY

PRODUCTS COMPANY WARREN, MICHIGAN



Beverly Inside Slotter

strength aluminum alloy, the slotter is 18 inches long x 91/4 inches high (less handle) and weighs 171/2 pounds.

#### Lathe Saw Attachment

Designed to fit all lathes with from 9 to 16-inch swing, as well as all milling machines, a band saw attachment with capacity of 8 x 18 inches is now being marketed by Alois Steiner, 1014 Washington St., Hoboken, N. J. The attachment, which can be made portable if desired, is available in larger capacities on order.

The attachment includes a 14 x 18-inch tiltable steel table and a double extra heavy steel pipe frame. Recommended for use with saw blades up to 34 inch wide x 80 inches long, the attachment is equipped with pulleys each having a special heavy gum rubber liner on the crown to minimize saw blade breakage.

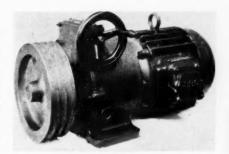
Steiner Lathe Saw Attachment



#### Infinitely Variable Transmission

The Beier Infinitely Variable Transmission now being marketed by the International Corp., Ltd., 19 Ebury St., London, S.W. 1, England, includes features of compactness, lightness, and high mechanical efficiency achieved by transmitting the power through a large number of points of frictional contact. As a result of this construction, the actual load at each individual point is very small and even when using copious lubrication to prevent wear, the necessary torque can be obtained with low mechanical pressures, it is claimed. These low pressures also permit high rotational speeds which are said to still further reduce the loading.

To obtain a large number of points of contact in a compact space, the frictional members used are discs. According to the manufacturer, due to the low pressure between the discs, the oil film remains unbroken at the points of contact so that even under the heaviest loads there is no wear on the frictional surfaces since there is no actual metallic contact. At all speeds, the efficiency is said to remain practically constant at between 85 and 95 per cent. An additional advantage claimed for the unit is its resistance to transmission shocks. It is stated that over-



Beier Infinitely Variable Transmission

loads can be sustained by the transmission for several minutes with 25 per cent slip without causing excessive overheating or wear.

#### Monochromatic Light and Optical Flat

A precision-measuring monochromatic light and optical flat for checking flatness accuracy to less than one light band

# Extension Bed Cap Lathes LATH Company of the second sec

Illustrated is the Series "AG" 20/40" Extension Bed Gap Lathe. Also made in 28/50" Heavy Duty.

The Extension Bed Gap Lathe is designed to be used either as a gap lathe or an engine lathe.

We also manufacture a line of regular geared head engine lathes.

Write for circulars.

The Nebel Matrie Tool Co.

(0.0000116 inch) are now being marketed under the "Lapmaster" trade name by the Crane Packing Co., 1800 Cuyler Ave., Chicago 13, Ill. Originally developed to check the extreme accuracy of parts lapped on the company's lapping machines, the monochromatic light is said to be equally effective for checking the light band flatness of any Super-finished surface.

The light is designed to provide better than 25 foot-candle power illumination on the checking surface. Its helium gas filled tubular light is recessed into the cover and diffuses light through a

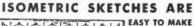


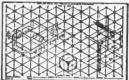


"Lapmaster" Monochromatic Light with Optical Flat in Stage-Type Position for Light Band Flatness Reading

flashed opal diffusing glass. Light transmitted is a strong, near one-color light of 11.6 millionths of an inch per dark interference band. The light source and checking stage are completely self-contained in a sturdy aluminum case. The unit is readily movable by means of an attached handle and is adjustable from the stage type to a bench type by rotating the head 180 degrees.

Made of high quality natural quartz, the Lapmaster Optical Flat, it is claimed. is highly transparent, has unusual wear characteristics, is abrasion resistant, and will withstand thermal shock. The flat is available in 1/10 and 1/5 light band types with accuracies of 0.00000116 and 0.00000232 inch respectively and in sizes ranging up to 6 inches in diameter.





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make you another steady user of WADE'S ISOME-TRIC blue lined paper. Shows all surfaces and interior to scale.

Makes clear blueprints. Saves time daily in hundreds of plants. Write for Circular.

Dept. H, R.F.D. #1 Wade Instrument Co. Chardon, Ohio





Whitman & Barnes Bit Stock Drill Set

parent. The drills are offered in three sets as follows: No. 13 containing 9 drills from to % inch in diameter; No. 13A containing 7 drills from 1/8 to % inch in diameter; and No. 13B containing 9 drills from 1/8 to 1/2 inch in diameter.

#### Hard Solder Alloy

A hard solder type alloy for joining aluminum to steel, bronze, and copper as well as aluminum has been announced by the Eutectic Welding Alloys Corp., Dept. P, 40 Worth St., New York 13, N. Y. Of interest to manufacturers of electrical aluminum units, delicate or thin gauge parts, the lowmelting high strength alloy, known as Eutec-Rod 192, is available in 16, 3/32 and 1/8-inch coil form

#### Bit Stock Drill Set

Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich., is marketing bit stock drills in sets which are contained in attractive plastic cases, the bottom part of each case being bright red and the hinged top transand is recommended for sealing cracks. spot welds, and the general soldering of aluminum. It is said to be especially useful where a solder as white as possible is

According to the manufacturer, Eutec-Rod 192 has a bonding temperature of 650-700 deg. F. and provides a tensile strength of 11,000 p.s.i., together with good corrosion resistance and excellent electrical conductivity. It is used with Eutector Flux 192, which acts as a temperature indicator. When the flux begins to smoke, the alloy is applied and spreads out rapidly throughout the entire joint.

# YOU CAN CUT a keyway for LESS THAN A DIME

#### with the duMONT Minute Man **KEYWAY BROACH**

With one Minute Man Broach and Bushing, costing only \$8.25, you can cut 100 keyways in gears, milling cutters, pulley hubs,

collars, couplings, etc. With Minute Man Kits you can cut keyways from 1/16" to 3/4" wide in bores from 1/4" to 3" by 1/16" steps.

#### For the whole story MAIL THE COUPON



The du Mont Corporation Greenfield, Mass. Please mail me Descriptive Folder and Price List "S".
Name
Company
Address

A clean, smooth weld without any damage to the base metal is claimed to be provided by use of EutecRod 292.

mit only the use of very small grinding wheels.

Said to be ideal for touching up dies



Keller 30A-7 Pneumatic Grinder

#### Pneumatic Grinder

A 15-oz. pneumatic grinder for the operation of grinding wheels of ½-inch diameter and smaller has been announced by the Keller Tool Co., Grand Haven, Mich. Designated as the 30A-7, the tool is compactly constructed, thus making it particularly useful for grinding in close quarters or where intricate designs per-

and similar tedious jobs, the grinder has a speed of 75,000 r.p.m. and is provided

with a housing that is designed to fit in the hand comfortably. An inverted throttle lever provides for convenient operating control. The standard spindle collet of the tool accommodates mounted grinding wheels with 1/4-inch diameter shanks. Optional equipment includes spindles with 3 or 4-inch capacity collet chucks.



Kempsmith Swivel Vises are precision tools with operating surfaces accurately ground to size and squareness. Jaws are removable and coolant return channel cast integral. Built to take hard, everyday punishment. Plain vises and heavy duty plain and swivel vises, also available. Ask for Bulletin No. 117.

Kempsmith Standard Attachments broaden the scope of your milling machine . . . lower capital investment . . . save in set-up time.

KEMPSMITH MACHINE CO. 1835 SOUTH 71st STREET MILWAUKEE 14, WIS., U.S.A.

#### KEMPSMITH

in all popular sizes or types. Adaptable to ANY make of milling machine with standardized spindle.

# **EMPSMIT**

Precision Built Milling Machines Since 1888

#### Self-Locking Set Screw

Known as the "Zip-Grip," a selflocking set and adjusting screw which is said to require no supplementary locking devices for efficient use has been announced by the Set Screw & Mfg. Co., 152 Main St. Bartlett. Ill. According to the manufacturer, the screw is specifically designed for set screw applications in which excessive vibration is a factor and for regulating and adjustment applications in which instantaneous locking at a precise point is desired.

The Zip-Grip provides a triple-locking



"Zip-Grip" Self-Locking Set Screw

action through a combination of interference fit, tension, and the locking of the set screw against the shaft or other

part. As shown in the accompanying illustration, the lower part (B) of the screw, which enters the hole first, has a standard thread, while the upper part (A), designated as the "activating area," has a larger pitch diameter of the thread section which creates an interference fit or expansion effect against the thread flanks. This results in a tension or op-posed-force action, causing the thread section of the upper part to be drawn downward and that of the lower part to be drawn upward in the direction of the locking action of the screw against the shaft.

The Zip-Grip Self-Locking Screw is available in all metals, including soft or hard steel (case hardened or heat-treated), stainless steel, brass, bronze, or aluminum. It may be obtained with any type of head to meet the particular requirements of the user.

#### Sheet Metal Perforating and Notching System

A system for perforating and notching sheet metal on a fast, efficient basis has been announced by the Wales-Strippit

#### DRILL BREAKAGE Reduced 86.7%

Here's How It Was Done!

Large automobile manufacturer famous for production efficiency, gave us the following report of a test of the Erickson Collet Chuck. As a result of this test, manufac-turer has standardized on Erickson Collet Chuck for this operation.

"Erickson chuck is used for drilling 1200 vent holes per day, average drill breakage one per day. We formerly broke from 8 to 10 drills with the \_\_\_\_\_\_ chuck. Now

ON THE MARKET

1. Delivers accuracy of .0005" TIR.

 Permits collapse of 1/32" (Replacing 7 standard single purpose collets)
3. Grips drills on flutes —

permits stubbing
4. Gives such positive grip due to exclusive surface contact.

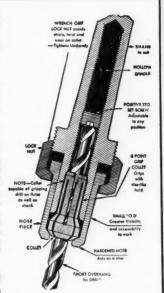
broke from 8 to 10 drills with the have average breakage of 2 drills per 900 oil holes drilled in pistons with \( \lambda\_0^{\text{off}} \) Erickson chuck. Had breakage of 15 drills per 900 holes using old drill sleeve method." Learn how this efficiency can be yours, too! Send for complete data on Erickson holding equipment now and learn how Erickson tools applied to your problems can boost production and

reduce costs.

#### ERICKSON TOOLS DIVISION

2301 HAMILTON AVE.

CLEVELAND 14, OHIO



Corp., 345 Payne Ave., North Tonawanda, N. Y. The system, which may be used in connection with both stamping presses and press brakes, consists of Wales self-contained units for perforating and notching operations; a T-slotted mounting base; a master template which is placed on the press bed and has pilot pin holes located over the entire surface area in the same pattern as the perforations in the finished piece of work; and set-up templets which are marked with the operation number and punch size and are placed on top of the master template to identify the pilot pin holes to be used in

each operation. The number of operations on each part depends on the quantity, size, and position of perforations.



Illustration Showing the Four Elements of Wales Perforating and Notching System: (1) T-Slotted Mounting Base, (2) Master Template, (3) Set-Up Templates, and (4) Hole Punching Units

According to the manufacturer, the Wales perforating and Notching System permits the use and reuse of the same group of units in unlimited setups on the master template.

#### **BRAZING TORCHES**



Other useful shop items.

Write for illustrated circular.

BUFFALO DENTAL MANUFACTURING CO.
Buffalo 3, New York



#### GRAY TURRET HEAD METAL CUTTER OR NIBBLER

N.A.M. Ploneer Award Given to Gray

Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet & Plate Shops.

GRAY MACHINE CO. Box 596, Philadelphia, Pa.

#### **Hydraulic Diamond Turner**

Designed specifically for use on Cincinnati centerless grinders, a hydraulic diamond turner designated as the Citco Model 1001-A is now being produced by the Cleveland Industrial Tool Corp., 1080 E. 222nd St., Cleveland 17, Ohio. The device is constructed to automatically reposition the diamond by hydraulic means. The turning operation is controlled by a valve which is automatically opened by the dresser unit.

# NO BUSHINGS, GUIDES or PILOTS NEEDED!

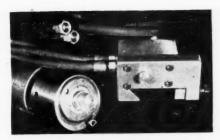
THE READING BROACH KEYSEATER

The Reading Fench Machine requires no bushings, guides or pilots. No other machine like it. Very fast—capacity from 1/8 to 1/8 cutter.

Low first cost-prompt delivery.

READING MACHINE COMPANY, Reading (Cincinnati), Ohlo





Citco Model 1001-A Hydraulic Diamond Turner

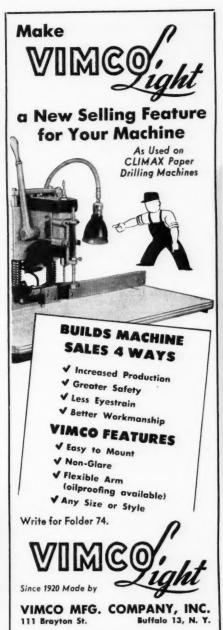
According to the manufacturer, the Citco Model 1001-A Hydraulic Diamond Turner is built to turn the diamond 3 degrees which is sufficient to present a sharp new cutting edge on the diamond and yet does not change the amount dressed off of the grinding wheel. All moving parts of the unit are hardened and ground. Rubber "O" rings are used on all diameters, and all tolerances are claimed to be held very close. Once installed, the device is said to require no further maintenance.

#### Lever-Operated Collet Attachment

The Monarch Machine Tool Co., Sidney, Ohio, has developed a lever-operated collet attachment providing up to 1½-inch round bar stock capacity for application on all Monarch Series 60 engine and toolroom lathes. Suitable for installation on these machines at the factory only, the attachment is so designed that it can be used for either draw-in or pusher-type collets. Both types are identical except

Lever-Operated Collet Attachment for Monarch Series 60 Engine and Toolmaker's Lathe





for the drawbar, collets and spindle nose adapter, thereby assuring quick conversion by the user from one type collet to the other.

Removal of the drawbar is said to be easily accomplished when the lever-operated collet attachment is in use. Also, the relation between the attachment and the collet itself can be adjusted readily from the exterior of the machine at the left-hand end of the headstock. The operating lever, extending up over the top of the headstock, is positioned conveniently to the operator standing in his normal operating position.



#### DRILL THESE HOLES

BY A QUICK, EASY, INEXPENSIVE METHOD Your business letterhead will bring literature. WATTS BROS. TOOL WORKS Wilmerding, Pa.



DRILL and PILOT BUSHINGS Frictionless -Rotary For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't

Write for details. GATCO ROTARY BUSHINGS CO.

1300 Mt. Elliott Ave. Detroit, Mich.

#### **Punch Press Set**

The Northwestern Tool & Engineering Co., 119 Hollier Ave., Dayton 3, Ohio, has added a punch press set to its line



Northwestern Punch Press Set

of toolmaker's products. The set consists of 4 studs of each of the following lengths: 3, 4, 5, 6, 7, and 8 inches; 4 coupling nuts; and 4 flange nuts. All items are packed in a sturdy plywood case. The studs can be furnished in thread sizes of ½-13, %-11, %-10, %-9, and 1-8.

#### Stock Stop

A stock stop primarily intended for Brown & Sharpe machines but which can also be used on any machine where a stock stop is indicated has been announced by the Balas Collet Mfg. Co., Dept. MM, 1557 E. 27th St., Cleveland 14, Ohio. The stop has a Carbolov face which, it is claimed, will not scuff or pick up material from the end of the bar, causing



#### YOU'LL NEVER KNOW

how much quality can be improved and production costs reduced on your second operation jobs until you have used a SPEEDGRIP PRECISION INTERNAL CHUCK.

GUARANTEED to give satisfactory results or money refunded.

Layouts will be made and prices quoted if prints are submitted. Send for descriptive folder today.

SPEEDGRIP CHUCK, INC. 1102 W. Beardsley Ave.



Balas Stock Stop

variations in lengths or damage to the finished end of the piece.

The Balas Stock Stop can be inserted into the machine turret and includes a shank which is hardened to avoid nicking or scratching by the clamping mechanism. The stop is available in diameters of %, %, and 1 inch, with each size furnished in two lengths.

Thread Forming Rotary Broach

The Shearcut Tool Co., Box 746 Reseda. Calif., has announced that Shearcutter its Thread Forming Rotary Broach heretofore a v a i lable only in fractional sizes in U.S. Fine and Coarse thread types is now also being offered in sizes for forming machine screw size threads. The tool is designed to cut threads by virtue of end pressure exerted by the cutting edge rather than by radial pressure alone.

The Shearcutter Thread Forming Rotary Broach is said to produce accurately threaded holes; is practically unbreakable; requires a minimum of power; works

equally well in most materials; does not bind or seize in the hole being threaded; does not tear the material being cut; has unusually long life; may be easily resharpened many times on a standard tool and cutter grinder; and feeds the chips out of the hole being threaded, thus preventing chip clogging and tool breakage. The broach may be used in tapping machines, automatics, turret lathes, engine lathes, or any machine adapted for a tapping operation. It can also be used for hand operation. The broach is interchangeable with standard taps and can be supplied to meet user requirements.



#### THE REVOLUTIONARY, BECKETT-ENGINEERED



Entirely new air valve gives complete control of air cylinder action! New Hi-Cyclic Air Valve functions same as ordinary operating valve—PLUS—controls stroke of air cylinder to .001"; reciprocates mechanically or electrically; controls pressure in both ends of cylinder; stops and returns stroke at any point without over-travel; controls stroke speed in either direction; effects a tremendous saving in air; maintains smooth, hydraulic-like action at all speeds. Operates on pressures as low as 1 P.S.I. Opens up unlimited applications for accurate, fast, smooth control for air-powered, labor-saving machinery. Write for details and recommendations. Ask for Bulletin 10.

(No. 1) Model B Busic Valve 3, 4 or 5-way valve in ½", ½" and ½" sizes. Small, compact. Gives complete control of air cylinder action. Also is reciprocating valve capable of 2500 cycles per min.

(No. 2) Model B-2 Valve
3 or 4-way valve in \( \frac{1}{2}\n'', \frac{1}{2}\n'' \) and \( \frac{1}{2}\n'' \)
sizes. Dual solenoids actuated by momentary contact — no complex switching controls. Makes possible any desired action. Controls stroke to .001".

Also available: single solenoid spring return valves,  $\frac{1}{8}$ ",  $\frac{1}{4}$ ",  $\frac{3}{8}$ "—heavy duty piloted valves, single and double solenoid,  $\frac{1}{2}$ ",  $\frac{3}{4}$ ",  $\frac{1}{4}$ "—hydraulic valves, single and double solenoid,  $\frac{1}{8}$ ",  $\frac{1}{4}$ ",  $\frac{3}{8}$ ".

BECKETT-HARCUM CO., 1142 Wayne Rd., Wilmington, Ohio

# THE New MODEL 1100 HYBCO TAP GRINDER

ACCURATELY GRINDS
CHAMFERS OF TAPS,
CORE DRILLS

SHARPENS FLUTES,
SPIRAL POINTS
OF TAPS

- \* Capacities No. 2 Mach. Screw to  $1\frac{1}{2}$ " Hand Taps.
- All Settings Adjustable To Give Any Angle—Relief—Hook.
- Taps Held In Precision Collets Can Be Sharpened After Center Is Destroyed.
- Standard Motor—Any Current Specification.

Representatives In Principal Cities

#### Henry P. Boggis & Co.

708 East 163rd Street Cleveland 10, Ohio



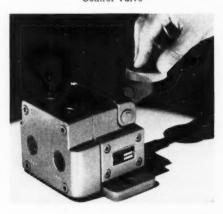
Shearcutter Machine Screw Size Thread Forming Rotary Broach

Right-hand spiral, right-hand cut are standard. Left-hand spiral, right-hand cut can be furnished on order.

#### Hand-Operated Air Valve

Introduction of a fast cycling type of hand-operated valve which provides four-way directional air control for the operation of single or double-acting pneumatic cylinders and other air-operated equipment has been announced by the Hannifin Corp., 1136 S. Kilbourn Ave., Chicago 24, Ill. Light pressure applied with the fingers, palm, or knee to

Hannifin Model NHS Hand-Operated Air Control Valve



#### THIS BURKE BENCH MILLER

\$240

COSTS only (less motor)



It's the little Miller with the big reputation for accurate work. For production, tool rooms, schools, hobbyists. Send for catalogue of hand and power feed models.

#### The BURKE MACHINE TOOL CO.

A Division of U. S. Burke Machine Tool Co. 22 East 72nd St. Cincinnati 16, Ohio

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NIBBLING MACHINE

NIBBLE YOUR COSTS

Ask for Free Bulletin "H"

Capacity 3/4"
mild steel



FOR TUBE SLOTTING, TUBE SHAPING AND CUTTING FLAT SHEFTS BY TEM-PLATE OR TO A SCRIBED LINE.

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Since 1885

Pioneer Mnfrs. of Nibbling Machines

### MULTIPLE DRILLING with a...



MULTI-DRILL

Increases Capacity Up to 800%
ADJUSTABLE TO ANY HOLE PATTERN
... FITS ANY DRILL PRESS

If your production requires drilling from 2 to 8 holes in a work piece, a MULTI-DRILL will cut costs and speed output up to 800%. The MULTI-DRILL is universally adjustable to any hole pattern—is compactly built to permit easy, unhampered operation with drill jigs or other special fixtures. Ruggedly built to take the wear and tear of high production work, the MULTI-DRILL will handle your long and short run multiple drilling jobs with ease and economy. The MULTI-DRILL will drill on hole centers as close as ½"—handle drill sizes up to ½" in steel. Special adaptations available.

There is a Commander MULTI-DRILL Distributor in your area. Write for his name, literature and complete details.

COMMANDER MFG. CO.

Product of Commander - Builder of the Commander Tapper

depress the control knob % inch is all the motion that is said to be required to operate the valve. Air line pressure, acting through a pilot control connected to the control knob lever, supplies the force to move the piston-operated main valve.

Designated as the Model NHS, the valve features a reciprocating, packless, self-lapping main valve disc. A light compression spring raises the control knob when the hand is removed. Ruggedly constructed for heavy duty industrial service, the valve is available in ½ to ¾-inch sizes for use with air line pressure

of from 25 to 150 lb. "In" and "out" air line connections are located in the top of the valve, with pipe connections to the air cylinder in the back. When it is desirable to provide remote control or simplify piping connections, the control knob can be located on the end of an extended rod connected to the operating lever.

#### Remote Welding Control

A complete remote control for d.c. arc welding machines has been developed by

the Foster Transformer Co., 3820 Colerain Ave., Cincinnati, Ohio. Designed to transfer all of the machine controls to the electrode holder. the unit consists of two parts; namely. a stainless steel control box for mounting on the welding machine and a standard electrode holder with special grip. With this equipment, the operator is not only able to start and stop the welding machine and select polarity but to also regulate the welding heat right at the holder. Connection between the holder controls and control box is effected by means of three No. 20 wires ropespiraled in the cable along with the work cable. A special connector is provided to splice in additional lengths of cable.

The holder proper is a standard make and readily replaceable. Two control knobs are located at the back of the holder grip concentric with the cable.





Bulletin

#### DORMAN **AUTOMATIC REVERSE** TAPPERS

 AUTOMATIC TORQUE CON-TROL... One Minute to Adjust ... Prevents Tap Breakage... Operator Need Not Be Skilled

WIDE RANGE TAP CAPACITY

No. 1 FRICTION DRIVE TAPPER -capacity #2-56 to 1/8" Steel-1/2" in Aluminum.

No. 2B POSITIVE TAPPER—capacity 3/4" to 3/4" in Steel.
No. 3A POSITIVE TAPPER—capacity 1/2" to 1/4" in Steel—1/2" to 3/4" Pipe Taps.

Priced from No. 4A TAPPER—capacity 34" to 2" in Steel including Pipe \$44.00 Taps. Write for

IMMEDIATE DELIVERY

#### THRIFTMASTER PRODUCTS CORPORATION

Division of Thomson Industries, Inc. 1034 N. PLUM STREET, LANCASTER, PA

NOARD UNIVERSAL ADJUSTABLE AND SPECIAL FIXED CENTER DRILLHEADS

#### MARK and DEMAGNETIZE **OPERATION**



The Luma combination etchtool and demagnetizer, etches, demagnetizes, anneals and solders. Permanently marks hardest steel with ease of a pencil. Write for complete information.

Luma Electric Equipment Co.

P. O. BOX 132-MS

TOLEDO 1, OHIO

# HARGRAVE

CLAMPS









No. 640 IMPROVED "I" BAR CLAMP

#### INDIVIDUALLY TE to insure better performance . . .

Hargrave Clamps have been constantly improved with the aid of skilled mechanics to offer greater operating advantages and increased durability. Individually Tested, they must be stronger, tougher, and flaw-free. Made in openings from 3/4 in. to 10 ft., from 1/2 in. to 16 in. deep.

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showing the complete line of Hargrave Individually Tested Clamps,
Chisels, Punches, Star
Drills, File Cleaners,
Brace Wrenches, Washer
Cutters, Saw Vises, etc.

1947 Waverly Ave. Cincinnati 12, Ohio



THE CINCINNATI TOOL COMPANY

There is an Industrial Distributor stock near you

One of the knobs actuates a doublethrow switch. Depending upon which direction the switch is turned from the ofp position, the machine is started with either straight or reversed polarity. The other knob is calibrated for reference and is used to adjust the heat with smooth stepless control.

For straight polarity down-hand welding, the control is said to cover almost the entire heat range, with one setting of the machine, from maximum down. For reverse polarity requirements, the machine is set for the largest electrode size with the machine voltage control



Foster Remote Control for D.C. Welders: (Above) Standard Electrode Holder with Special Grip; (Below) Stainless Steel Control Box

full on. The control, it is claimed, will then cover not only the rod size selected but the next two smaller rod sizes as well.



#### Variable Ratio Pantograph

Engraves an area 5 by 5 inches on curved surfaces without special templates, with smooth lines in any design, number, letter; on iron, brass, copper, aluminum, soft steels and all plastics. • Drills a series of holes • Profiles small parts • Increases accuracy and production • Works from original drawing or templates • Etches glass and similar items • Will not cause distortion. For information and prices write Dept. M.

Consult your distributor or

#### AUTO ENGRAVER CO.

Florida Hill Rd.,

Ridgefield, Conn.

#### Aluminum Pipe Wrench

An aluminum pipe wrench which is fully drop forged from special high tensile aluminum alloy carefully heat treated for maximum strength and durability has been announced by J. H. Williams & Co., 400 Vulcan St., Buffalo 7, New York.

Light in weight and designed to withstand abuse and severe usage, the wrench has a natural satin finish and includes replaceable alloy steel cadmium plated jaw inserts which are interchangeable.

#### GILMORE DIAMOND TOOLS



NEEDLEPOINT DIAMONDS (PHONOPOINTS)
SHARP, DURABLE, BEST QUALITY; DISCOUNTS IN QUANTITIES

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#### **Reduce Set Up Time USE SEIBERT ADAPTERS**

The Standard of Comparison



Precision Adapter Assemblies. Morse Taper, Stub Taper, and Special Adapters, Spindle Extension Assemblies, Micro-Nuts.

Also manufacturers of:

Standard and Special Slip Spindles, Bracket Spindles, Arms, Brackets, Universal Joints, Lower Drive Assemblies, Upper Drive Assemblies and Pinion Shafts for Multiple Spindle Drilling Machines.



Write for Catalog

Seibert & Sons, Inc. East Peoria 8, III.

Why Use A Shaper to cut Keyways when a



DAVIS

job so much guicker and better?

Sand for Circular



#### DAVIS KEYSEATER CO.

Exchange and Glasgow Sts. ROCHESTER, N. Y.

... By the box or buy the billion they're UNI-QUALITY

B-RIGHT-ON SOCKET SCREW PRODUCTS

Uniform top-quality . . . that's the mark of B-Right-On Socket Screw Products. Best materials...most modern production methods . . . careful inspection keep **Brighton Products** up to that "Excellent" rating they have earned with wise buyers. Compare a pair... compare a hun-



dred . . . Brighton Screws are Uni-Quality.

Want to see for yourself?

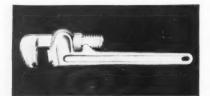
FREE SAMPLES

NO OBLIGATION . . . JUST WRITE Specify types and sizes

THE BRIGHTON SCREW & MFG. CO.

READING RD. at DORCHESTER CINCINNATI 2, OHIO

The inserts each feature a multiple dovetail design and retaining screw for easy assembly and firm anchorage. The mov-



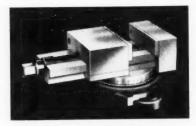
Williams Aluminum Pipe Wrench

able jaw is suspended between two springs in such a manner as to assure an immediate and positive gripping action. The steel adjusting nut of the wrench is case hardened, knurled for easy adjustment, and cadmium plated.

#### Small Machine Vise

A small swivel vise for holding work on shapers, milling machines, drill presses, and other machine tools has been announced by the South Bend Lathe Works, 386 E. Madison St., South Bend 22, Ind. The vise jaws have replaceable hardened steel inserts 4 inches wide x 1 inch deep. The maximum jaw opening is 4 inches.

The base of the vise is provided with two open slots spaced 7½ inches apart for bolting the vise to the machine table. The vise is arranged to swivel on the base and has 180 degrees of graduations reading from 0 to 90 degrees right or left. Positive swivel locking is provided for



South Bend Small Machine Vise

by two socket head screws and plug binders. A wrench is included for operating the vise.

# SELECT THE BEST... Balancing Tool for Your Work from Sundstrand's Complete Line

Here's a complete line of Balancing Tools which will save their cost quickly on balancing or truing operations. Accurately sensitive and durable, they provide a simple, reliable means for checking the balance of parts like gears, shafts, fly wheels, pulleys, etc. The standard sizes available are shown in capacity chart at right.



#### FREE ADDITIONAL DATA

You can obtain complete information on Sundstrand Balancing Tools by writing for bulletin No. 592.



Swing	Between Standards	Weight Capacity	
21 in.	20 in.	12 lbs.	
21 in.	20 in.	800 lbs.	
43 in.	29 in.	800 lbs.	
43 in.	29 in.	2,000 lbs.	
6 ft.	5 ft.	5,000 lbs.	
8 ft.	8 ft.	10,000 lbs.	
Any	Any	24,000 lbs.	
43 in.	30 in.	800 lbs.	

SUNDSTRAND
MACHINE TOOL COMPANY

2539 Eleventh St. Rockford, Ill., U.S.A.

#### TROYKE ROTARY TABLES

WORM WHEEL OPERATED ROTARY TABLES . . . .



#### BALL BEARING STATION INDEXING TABLES . . .



12", 15", 18"

See your dealer or write for Catalog 14.

TROYKE MFG. CO. Cincinnati 9, Ohio, U. S. A.



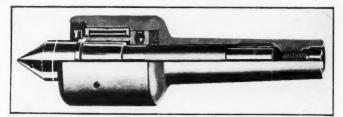
## GEM MACHINE VISES FIND HUNDREDS OF USES



For drill press, milling machine, planer, grinders, etc. Available in convenient sizes from 3" to 12" capacity and in plain, swivel, and tilting types. Strong and durable with many exclusive time saving features. Write for circular giving complete description of our entire line of GEM VISES.

J. E. MARTIN MACHINE WORKS

#### **NOW..Give Production a Lift!**



Boost production of high speed turning operations. Use MOTOR TOOL LIVE CENTERS (Ball and Roller Bearing). The only center with the RED BAND OVERLOAD INDICATOR, which prevents overloading of thrust bearings.

Designed for long trouble-free operations, MOTOR TOOL LIVE CENTERS require minimum care for maximum production.

Write for bulletin giving all the advantages of these Live Centers.

ACME TOOL COMPANY

69 WEST BROADWAY

(EASTERN DISTRIBUTOR)

NEW YORK 7, N. Y.

#### Flexible Shaft Power Units

Known as the "Jiffy Tool" and the "Speed Jiffy," two flexible shaft power units which can be used for polishing, routing, brushing, grinding, buffing, drilling, filing, sanding, and various other operations have been developed by the Stow Mfg. Co., Binghamton, New York. The Jiffy Tool is a 3-caster floor model,

delivering 1/4 h.p. at 1,750 r.p.m. through a 5-foot flexible shaft. The motor unit is designed for operation on 110 volts, 60cycle single-phase a.c. Both 1/2 and 1/2 h.p. units can be supplied on order.

#### ADVANCE CLAMPS

Cut Set-Up Time 75%

#### MILLING MACHINES

THE ONLY T-SLOT CLAMP For use on all machines with T-slots.

Manufactured and sold by

ADVANCE MACHINE WORKS FORT WAYNE 7, INDIANA



**Durable • Accurate • Economical** 

The inherent hardness and durability of granite, accurately finished to a guaranteed tolerance of .00005", provide the most efficient and economical surface plates for precision measurement operations. Sizes up to 8' x 16'.

\* Non-Magnetic agnetic \* Can Not Warp

\* Corrosion-proof Write for Free Trial Offer

THE HERMAN STONE COMPANY 324 Harries Bldg. • Dayton 2, Ohio



Stow "Jiffy Tool" (Above) and Stow "Speed Jiffy" (Below)

Designed for more complex operations, the Speed Jiffy has three speed variations of 1,000, 1,750, and 3,000 r.p.m. which are obtained by merely altering the plug-in position of the flexible drive shaft. The unit features an automatic tensioning belt which is said to eliminate the need for adjustments in the belt.

#### Hand Lever Bed Turret

The accompanying illustration shows the Enco Hand Lever Hexturret, product of the Enco Mfg. Co., Dept. 1129, 4524 Fullerton Ave., Chicago 39, Ill., which is available for all lathes from 9 to 12-inch swing and can be furnished with a 414 or

#### LE COUNT'S EXPANDING MANDRELS in the 1001 Room. Carl



W. G. LE COUNT TOOL WORKS SOUTH NORWALK, CONNECTICUT, U.S.A.

• For use on Lathes, Grinders or Milling Machines for increased production and also a Time Saver in the Tool Room. Qwik action—

Designed for Accuracy, Strength and Long Service. No fragile parts to wear out. The three blades used in construction correct any inaccuracy of the bore. A set of 5 will take bores from \( \frac{3}{6} \) inch to 4 inch inclusive. Extra keys can be fur-nished on No. 5 Mandrel for bores to 7 inches

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The FIRST
CARBIDE TIPPED
STAINLESS STEEL SCRIBERS
AND CENTER PUNCHES

are <u>NOW</u> available
For full particulars apply to
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Man portable power tools



STOO JIFFY TOOLS

#### **IDEAL FOR:**

- BUFFING
- FILING
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- ROUTING
- GRINDING
- BRUSHING



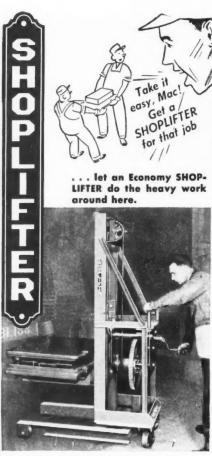
With these power machines, you bring the tool to the job, instead of the job to the tool. And Stow Jiffy Tools are priced so low that no tool room or shop need do without one!

Write for Stow's free Bulletin 494 containing full information.



MANUFACTURING CO.

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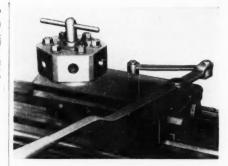


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All steel, arc welded frame. Easily operated hoist unit with automatic brake, safely holds load at any height.

500 pound capacity	£1.57.50
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Type D, hand operated	
Type DE, electric 1/3 HP unit	\$315.00
1000 pound capacity	,
Type DX, hand operated	\$320.00
2000 pound capacity	,
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Floor lock to hold machine s	teady:
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Enco Hand Lever Hexturret

6½ inch working travel. Features of the turret include hand scraped and spotted bearing surfaces, hardened indexing mechanism, and rigid topside clamping.

According to the manufacturer, the Enco Hand Lever Hexturret, due to its extreme accuracy, is particularly adaptable for close tolerance work in aluminum, brass, mild steel, and plastics.

#### Universal Drilling Plate

A universal drilling plate for use in the drilling and reaming of accurately spaced holes has been introduced by Montgomery & Co., Inc., 53 Park Place. New York 7, N. Y. The plate includes clamps which are designed to hold the work firmly against the two side rails of the unit. Gage blocks and a master drill disc are used to locate the position of the hole.

According to the manufacturer, the drill plate eliminates the necessity of re-

Montgomery Universal Drilling Plate





No waiting when you order Greaves Silent Bakelite Gears. . We have them in stock NOW! . Your order will go forward immediately. . You'll appreciate the silent operation and added smoothness provided by Greaves Silent Bakelite Gears, . You'll marvel at their great strength to carry big power loads . . . their remarkable ability to successfully operate com-

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Time . . . Money . . . Labor! We also make si'ent gears of rawhide and Fabroil. Write for Circular.

Cincinnati, Ohio

reaves machine tool co. 2015-39 Eastern Ave.

**BUILT RIGHT! PRICED RIGHT!** GREAVES MILLING Simple in design. Easy to operate. Rigid construction including every worthwhile modern feature of milling machine development. With 18 spindle speeds (20 to 1000 R.P.M.) both the universal and plain millers are readily adaptable for heavy duty or light precision production work. Send for bulletin. BULLETIN PRICE LISTS reaves MACHINE TOOL CO. 2015 Eastern Ave. Cincinnati, Ohio



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moving work in order to drill since all holes are located simply by using the proper accurate gage blocks. The master disc gage is made of tool steel and is hardened, ground, and lapped to 0.00006 inch. The disc gage hole is tapered for quick removal of the bushing.

#### Hydraulic Pump

For operating material handling equipment of various types, the Lyon-Raymound Corp., 3952 Madison St., Greene, N. Y., has placed on the market an air-operated hydraulic pump which is available with several styles and sizes of oil reservoir. The pump is a single-acting air-



Lyon-Raymond Air-Operated Hydraulic Pump

operated unit in that it makes one stroke of its piston each time the valve, operated

> by a foot pedal, is opened. The release is operated by another foot pedal.

# NIBBLING . . The easy way to cut odd shapes from sheet stock



The Campbell Nibbling Machine operates by means of a rapidly moving circular punch over a circular die. The combination of punch and die takes a small "bite" with each stroke of the punch. The cut is made by holding the work against the pilot of the punch and

following templet or scribed line. Since the punch and die are round, work can be fed equally well in any direction. The operator may use both hands in guiding the work, which makes it easy to cut intricate shapes.

The Campbell line of Nibbling Machines includes 7 models. Up to  $\frac{1}{2}$ " steel may be nibbled in sheets up to 60" in width. On the Model 250,  $\frac{1}{4}$ " steel may be cut from sheets up to 72" wide.

Source: CAMPBELL MACHINE DIVISION
American Chain & Cable
931 Connecticut Avenue

Power Hack Saw Blade

The "Red Rocket," a power hack s a w blade, has been added to the line of metal cutting saws manufactured by the W. O. Barnes Co., Inc., 1297 Terminal Ave., Detroit 7, Mich. Highly recommended for production work, the blade is said to be capable of withstanding heavy feeding pressures because of its flexibility and toughness.

#### New Packages for Grinding Wheel Dressers

A pull-out type box of heavy weight cardboard designed for increased ruggedness and easy identification of Desmond

Bridgeport, Conn.

#### AUTOMATIC CHUCKING AND INDEXING FIXTURE



1.—1800 light cuts per hour.
 2.—Either horizontal or vertical position.
 3.—Collets changed instantly.

4.—Automatically knocks piece out.

Model D—Ratchet indexing only—1" cap.

Model E—Both degree and ratchet indexing

-Capacity up to 1' Model F-Both degree and ratchet indexing -Capacity up to 21/4"

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#### Top Rim STEEL STACKING BOXES

18" x 12" x 6". 16 Ga. with Drop Handles

#### STANDARD SIZES

16 x 10 x 6.... 18 Ga. 16 x 10 x 6.... 16 Ga.

18 x 12 x 6..... 16 Ga.

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#### WE MANUFACTURE ALL TYPES OF STEEL BOXES

We make a specialty of boxes made to fit your particular handling requirements. Special boxes designed so they can be run thru with standards enable us to quote prices comparable with that of a standard box.

FACTORY EQUIPMENT CO

183 CHARLES ST. PROVIDENCE, R. L



New Sturdier Packages for Desmond Grinding Wheel Dressers

grinding wheel dressers has been announced by The Desmond-Stephan Mfg. Co., Urbana, Ohio. Three sizes of boxes are to be used to accommodate the various sizes of Desmond-Huntington, Desmond-Hex., and Desmond-Huntington, Desmond-Hex. Large easy-to-read type printed on yellow boxes with half circles in which the size numbers of the dressers appear provide for quick product identification on shelves. Labels of different colors are used on the various boxes to distinguish different types of grinding wheel dressers.

#### Slip-Joint Pliers

Designated as the No. 550-8, a slip-joint pliers with offset pistol-grip handle that is designed to fit the natural hand grip and enable the user to reach hard-to-getat jobs has been announced by the Utica Drop Forge & Tool Corp., Utica 4, N. Y. Normal pull on the handles of the pliers is said to tighten the grip on work and provide maximum holding power for wire twisting or pulling.

Made of drop forged alloy steel, the pliers, due to its pistol-grip feature, is



Utica No. 550-8 Pistol-Grip Slip-Joint Pliers

said to assure efficiency with minimum effort, reduce wrist fatigue, and prevent slipping and skinned knuckles.

#### Eliminates Costly Special Purpose Jigs . CIRCULAR MILLING ATTACHMENT



- Precision Built
- In 14 Sizes from 9" to 25" diameter
- 3 Styles-worm, cam and station indexing
- Exceptionally low priced from \$97

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For your "Rockwell" testing, you want an instrument that gives you results of unquestioned accuracy. Years of research have gone into making the CLARK Hardness Tester just such a precision instrument.

The CLARK gives you accurate results for every production requirement. It is durably built to give you years of dependable service. It is fast and simple to operate; easy to maintain. Compare the CLARK and see for yourself how much more it has to offer.

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\$450.00 F.O.B. Detroit Complete with diamond penetrator

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Two Speeds Large Table Guarded Wheels Tilting Spindle
Dust Collecting Facilities
Oscillating and Non-Oscillating

The Master Profile Grinder is an entirely new development in the metal grinding field. A tilting spindle with an incline range of from 90° to 60° is the outstanding feature. The table is constantly in a horizontal position. A precision protractor, read by means of a dustproof lighted periscope from the top of the table, permits setting to within one-quarter of 1°.

The large cast iron alloy heat-treated table measures 24" x 25".

Write today for complete information on this outstanding grinder. It can do close, accurate work quickly on a wide range of metal working jobs.

Dealer inquiries invited, foreign and domestic.

#### THE KINDT-COLLINS CO

12650 ELMWOOD AVE., CLEVELAND II, OHIO

#### New Books

How Salaried Employees Benefit from Job Evaluation. By R. M. Schmitz. Published by National Foremen's Institute, Inc., New London, Conn. 32 pages. 5½ x 8½ inches. Illustrated. Paper bound. Price, 50 cents per copy, less in quantity.

Intended for use by companies which plan to install job evaluation or have such a program now in effect, this booklet, in four brief, clearly understood chapters, explains what job evaluation will and will not do for the employee. The author pre-

sents steps for setting up the program, covering every individual that comes under it. Finally, the major advantages of the job evaluation program are discussed.

Industrial Film Bibliography. Published by National Metal Trades Association. 122 S. Michigan Ave., Chicago 3, Ill. 100 pages. Price, \$2.00.

Prepared under the direction of the N. M. T. A. committee on industrial training headed by C. H. Edgar of the Otis Elevator Company, this pamphlet lists 1,400 motion pic-

ture and slide film training aids and provides an up-todate and complete revision of the bibliography and supplement released in 1947 and 1948 respectively. Offering pertinent information on audiovisual aids for supervisory a n d employee training programs, the bibliography lists both sound and silent films available for showing at employee meetings in the metal industry. as well as in industry in general. Each film is fully described as to contents, running time, availability. and whether black and white or colored, sound or silent. Several sources from which each film may be purchased, rented, or borrowed, as well as the sales or rental price charged, if any, are given.





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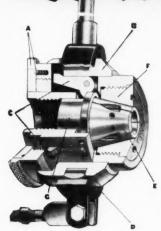
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supported. Another Levermatic operator cut machine rates from 441/2c to 221/2c per 100 pieces. We can tell you hundreds of special adaptations to lathes, grinders, millers, drill presses. Send for catalog.

A — Pressure adjusting ring with ball detent lock

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E - Parallel grip design collet

F — Precision ground closing ring

G-Collet pusher sleeve

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#### New Shop Literature

The publications listed in this section may be obtained free upon written request on company letterhead to the manufacturers concerned. Your courtesy in mentioning MODERN MACHINE SHOP when requesting copies of these publications will be sincerely appreciated by the manufacturer and the publisher of this magazine.

"Our Story in Pictures" is the title of a 16-page two-color booklet issued by the American Non-Gran Bronze Co., 105 Lancaster Ave., Berwyn 5, Pa., which describes and fully illustrates the contract manufacturing facilities of the company for precision machine work, bronze castings, and Non-Gran bronze products.

Combination Decimal Equivalent Chart and 1950 Calendar is now being distributed by the Dayton Rogers Mfg. Co., 2824 13th Ave., S., Minneapolis 7, Minn. The decimal equivalent chart is printed in two colors (black and red) and can be easily read at a given distance.

Mult-Au-Matic and Vertical Turret Lathe Tools and Tool Applications are fully illustrated in a 28-page booklet issued by The Bullard Co., Bridgeport 2, Connecticut.

Precision Levels. William B. Fell Co., 320 McLain Ave., Rockford, Ill., has available literature illustrating and describing its various "All-Way" Precision Levels for machine tool manufacture or maintenance.

Cutting Tools. Circular Tool Co., Inc., Providence 5, R. I., has published a Catalog "M" covering its entire line of circular metal cutting saws, combined center drills and countersinks, and reamers. The catalog illustrates saws ranging in diameter from ¼ to 10 inches in high speed steel and from ¼ to 6 inches in carbon steel. In addition, the Circle R line of solid carbide and carbide-tipped saws is presented. Also provided are a table of cutting speeds, speeds and feeds for high speed circular saws, millimeter conversion tables, table of decimal equivalents, and speed conversion table for carbide saws.



Venturi-Ball Valves are fully described in a 16-page two-color bulletin (No. 103) released by the Paul Valve Corp., 683 Third Ave., New York 17, N. Y. The well-illustrated catalog covers principle of operation and provides engineering data on the complete line which includes "whistle" valves, bar stock valves, cast steel and stainless steel valves, and forged valves.

Pyrometer Indicators with quick-coupling thermocouple connector panels for general industrial temperature measuring applications are illustrated and described in a four-page two-color catalog section (No. 25) issued by the Thermo Electric Co., Inc., Fair Lawn, N. J.

Narrow Face-to-Face Valves. A 12-page two-color catalog (No. 18) illustrating and describing a line of 50-lb. narrow face-to-face valves designed particularly for rugged hydraulic service is available from the R-S Products Corp., Wayne Junction, Philadelphia 44, Pennsylvania.

Soldering Products. A complete line of soldering products made by the P. Wall Mfg., 367 Erie St., Grove City, Pa., is illustrated and described in a 28-page catalog (No. 85) issued by this firm. Products covered include blow torches, soldering irons, solders, splicer's furnaces, compound kettles, and various other items.

Die Catalog Supplement. Containing details of improved features in standard round hole dies, Supplement D-3 to its general die catalog (D-126) has been issued by the Carbolov Co.. Inc., 11143 E. 8 Mile Ave., Detroit 32. Mich. The supplement lists specifications and prices of dies R-1 through R-19 for drawing wire, bar, and tubing.

Powder Metallurgy is the subject of a four-page two-color bulletin (No. 149) published by American Sintered Alloys, Inc., 968 Farmington Ave., West Hartford, Conn., which explains clearly what powder metallurgy is and points out its wide range of applications. The bulletin is well illustrated with actual case studies.

# Get Positive Lubrication and Lower Maintenance Costs . . .



#### WITH ACRO LUBRICATORS

Here's a positive way to get lubricating oils to the bearing surfaces of motors. Oil ring, capillary, ball or roller bearings receive constant lubrication. In addition, bearings on blowers, line shafts and similar installations are serviced for periods as long as 6 months to 1 year with one filling. You save 50% to 95% in oil consumption, practically eliminate maintenance and burnt-out bearings due to faulty hand oiling and guesswork. Acro Lubricators pay for themselves in oil savings alone. There is no drippage, no waste, no overflow. Oil is automatically fed to bearings. After installation they require no further adjustments.

#### **Features**

Easy to install • Single adjustment
• Automatic feed • No floats,
no valves, no moving parts.

#### Free Bulletin

The Acro Lubricators, as well as other Acro products, are illustrated in this 4-page folder. Write for complete facts today. Ask for Bulletin MM10.



ACRO METAL STAMPING CO.

Reamers and Reamer Grinding Fixture are fully illustrated and described in a 16-page catalog available from The Bullard Co., Bridgeport 2, Connecticut.

Dynamometers which are claimed to provide dependable test data on prime movers, including B.H.P., torque, efficiency, load, fuel, and life, are shown and described in a four-page two-color bulletin (No. 760) issued by the Taylor Dynamometer & Machine Co., 5108 W. Center St., Milwaukee 10, Wisconsin.

Machine and tool Accessories, including various sizes of hand knobs, handwheels, handles, jig and fixture components, and master shank holders, are listed as to specifications and prices in a 16-page illustrated catalog (No. 50) issued by George F. Bub & Son, 6015 Bradley Ave., Cleveland 9, Ohio.

"Material Handling—at the Machine" is the title of a 16-page booklet distributed by the Lyon-Raymond Corp., 20362 Madison St., Greene, N. Y., which shows how

proper "positioning" of materials saves unnecessary handling during production operations. The booklet contains illustrations and descriptions of 12 different types of equipment of various manufacturers and includes two process charts as examples for determining the exoperations from time of receipt of materials to shipment of finished product.

Air Valve. The Beckett - Harcum Co., 1140 Wayne Rd., Wilmington, Ohio, has published a six-page illustrated bulletin (No. 10) covering its "Hi - Cyclic" Air Valve. The bulletin contains data on the operation and construction features of the valve and complete descriptions, illustrations, and engineering drawings of various models. including the basic valve, dual exhaust or 5-port valves, single and double solenoid valves. piloted valves, and 4 - way hydraulic valves.



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Unit Dust Collector. A four-page twocolor bulletin (No. 20M) published by The Kirk & Blum Mfg. Co., 2816 Spring Grove Ave., Cincinnati 25, Ohio, describes and illustrates the company's new Type "M" Unit Dust Collector which is available in capacities of 450, 900, and 1,800 c. f. m. at high velocity for handling dust from grinding, buffing, and polishing machines, as well as other dust sources.

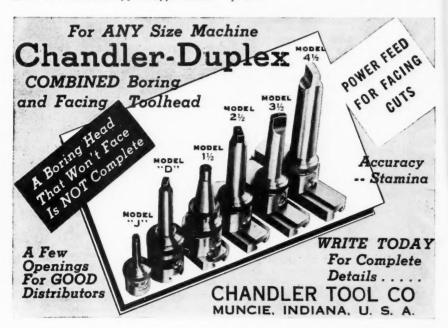
Fluid Drives are features in a 28-page catalog and engineering data book (No. 2385) released by the Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill. Typical applications of the drives in connection with various types of conveyors, cranes, punch presses, screw feeders, and so on, are covered.

Dial Air Gage. A 16-page two-color catalog (No. DTP-491) issued by The Sheffield Corp., Dayton 1, Ohio, features the Sheffield Dial Type Precisionaire, a dial air gage for dimensional checking with extremely quick, dead-stop indicator action. The catalog illustrates and describes various models of the instrument and shows numerous typical applications.

Snagging Wheels. Mid-West Abrasive Co., Owosso, Mich., has issued a fourpage three-color folder illustrating and describing its new "Fiber-Cushioned Snagging Wheels which are designed to absorb much of the shock and vibration resulting from snagging operations.

Disc Clutches with gear tooth and pin drives are covered as to construction features, operation, applications, installation, sizes, prices, horsepower ratings, and so on, in a 12-page bulletin (No. SF-5) available from The Edgemont Machine Co., Dayton, Ohio.

Electric-Eye Flame Cutting. A fourpage two-color bulletin published by Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, Ill., illustrates and describes intricate and unusual steel shapes supplied by this firm cut to user specifications with Electric-Eye flame cutting equipment. Typical of some of the irregular shapes furnished include Diesel locomotive parts, sprockets, grinding wheels, boom bars, crankshafts, machine and equipment frames, and ornamental pieces.



Air and Hydraulic Devices. Announcement has been made by the Logansport Machine Co., Inc., Logansport, Ind., of the second printing of the pocket size booklet titled "The Facts of Life on Air and Hydraulic Devices." Compiled specifically as a service to tool engineers, designers, and maintenance men, the booklet presents in concise, matter-of-fact style the "Do's," "Don'ts," and "What To Look For" phases of setting up and servicing air and hydraulic valves; air, hydraulic, and air-draulic cylinders; hydraulic power units; lines, and power chucks.



# DUST

Ideal protection for grinders, polishers, buffers. Easy breathing. 40 sq. in. filter area. Weighs only 4 oz. U.S.B.M. approved for type "A"dusts. Sample \$2.50 p.p.

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GRINDERS

10,000 IN USE

THEY HAD TO BE
GOOD TO BE SO
FAVORABLY KNOWN
FOR SO LONG

Established 50 Years

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BEVERLY • MASSACHUSETTS

Electric Blowers and Exhausters. An eight-page two-color bulletin (No. 3014-D) published by the Buffalo Forge Co., 388 Broadway, Buffalo 5, N. Y., illustrates and describes a line of electric blowers and exhausters for use in shops where air is required for oil or gas furnaces, for cupola work, gas boosting, or other services requiring constant air pressures up to 5.500 cubic feet per minute.

Centrifuges. Operating details, specifications, and application data on a complete line of Super-Centrifuges are provided in a 24-page bulletin (No. 1248) published by The Sharples Corp., 2341 Westmoreland St., Philadelphia 40, Pennsylvania.

Wire and Ribbon Stock Reels for use in connection with wire forming machines are illustrated and described in an eightpage two-color bulletin (No. 51) prepared by The A. H. Nilson Machine Co., Bridgeport, Connecticut.

Utility Cabinets and Stands. Bulletin SE-749 issued by Monarch Metal Products. Inc., 724 S. Columbus Ave., Mount Vernon, N. Y., illustrates and describes a line of utility cabinets and stands for factories, machine shops, toolrooms, shipping departments, and so on.

"An Entirely New Approach to Case Hardening" is the title of a 12-page folder issued by the Denfis Chemical Laboratories Inc., 172 Pacific St., Brooklyn 2, N. Y., which presents detailed examples, together with photographs, of the application and use of Carburit Pack-Hardening Paste and Isopac Isolating Paste.

#### GRINDING WHEELS

WIRE WHEELS SAVE 50% to 75% 150,000 pieces in stock for

IMMEDIATE SHIPMENT
Abrasives our Specialty.

We stock industrial supplies.

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Increase Tap Efficiency 600% and More.

The Blake method of grinding flutes as ures equal rake angles on all flutes . . . equal distribution of the cutting lower. This positive, speedy mechanical means of sharpening straight flutes and spiral points of taps is unanimously acclaimed by users.

Your initial investment in a Blake Flute Grinder is soon repaid. Sharpened by this method, your taps are less apt to break, are uniformly accurate, and their effective life (by actual reports from users) is increased 600% and more!

Write for Bulletin 649S on "How to Control Rake Angle on Your Taps".





"Faster Gear Production" is the title of a 20-page technical booklet prepared by the Illinois Tool Works, 2501 N. Keeler Ave., Chicago 39, Ill., which presents a careful and thorough analysis of the advantages of Fast Index (multiple thread) hobs and the opportunities for exploiting the full production capacity of present gear-manufacturing equipment. Technical data on finishes, performance characteristics and comparative rates of production in various types of applications are provided.

Portable Electric Drill Kits. Portable Electric Tools, Inc., 320 W. 83rd St., Chicago 20, Ill., has issued a four-page two-color catalog presenting illustrations, descriptions, and prices of various models of portable electric drill kits for drilling, buffing, cleaning, polishing, sanding, tool grinding, and other operations.

Jig Borer with 36 x 72-inch rectangular table and designed to locate, bore, and check is described and illustrated in a four-page two-color circular released by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Connecticut.

Hardening Compound Report. An eightpage illustrated technical report (Bulletin No. 11) on treating carbon steel with an activated carbon-chromium hardening compound known as "Hi-Speed-It" is now available from the Wilson Carbon Co., Inc., 60 E. 42nd St., New York 17, New York.

Multiple Spindle Adjustable Drill Heads. Literature covering the specifications, features, and so on, of its various models of "Kwick-Change" multiple spindle adjustable drill heads is available from the Wisconsin Drill Head Co., Butler, Wisconsin.

Seven-Inch Bench Shaper is fully illustrated and described in a four-page two-color bulletin (No. 500) published by the South Bend Lathe Works, 427 E. Madison St., South Bend 22, Ind. The bulletin also describes and illustrates a three-drawer steel stand as well as motors and tools for the shaper. Prices of all items are listed.

Shape Cutting Machine designed to cut any desired shape within a 56 x 32-inch area in ferrous metal up to a thickness of 8 inches is described in detail and fully illustrated in a 12-page bulletin issued by the Air Reduction Sales Co., 60 E. 42nd St., New York 17, New York.

Broaches. The Kase Machine Co., 18432 Buffalo Ave., Cleveland 19, Ohio, has available a multi-colored illustrated bulletin covering its complete line of "Glenny" push broaches and eccentric adapters. Designated as the No. 12, the bulletin provides operating and engineering data, specifications and prices.



#### For Your Convenience ...

the "Where to Get It" section of MODERN MACHINE SHOP, originated in February, 1940, provides a quick reference to machinery, tools and supplies advertised in the current issue. Use it consistently. You'll find it's very helpful. (See pages 276, 278 and 280.)

MODERN MACHINE SHOP

Industrial Safety Equipment. A 64-page catalog illustrating and describing a line of eye and respiratory equipment for industry has been issued by Willson Products, Inc., Reading, Pa. The catalog includes considerable technical and reference material to help the user select the proper type and style of equipment for the specific occupational hazard involved and to provide him with information on its use and care.

Drill Jigs. Literature on "Johns" Drill Jigs equipped with universal jaws for use in second operations such as drilling, tapping, threading, chamfering, end milling, and so on, is now available from the Heuser Mfg. Co., 1638 N. Paulina St., Chicago 22, Illinois.

Flexible Shafting. Elliott Mfg. Co., 95 Prospect Ave., Binghamton, N. Y., has prepared a four-page circular (No. 4a) illustrating and describing a line of flexible shafts, unit drives, attachments, and push-pull controls designed to provide an economical and practical means of transmitting power to out-of-the-way places.

Jobbing Work. Hardinge Mfg. Co., 240 Arch St., York, Pa., has issued a 12-page illustrated bulletin (No. AS-400) describing in detail its facilities for pattern and casting production, machine work, plate steel work, and the manufacture of custom-built machinery.

Silent Chain Drives. A catalog (No. SCS-49) announced by the Whitney Chain & Mfg. Co., Hartford 2, Conn., is designed to facilitate the selection of silent chain and chain drives. Covered are chain drives for applications falling within a range of fractional horsepower to well over 50 horsepower.

Charts for Optical Comparators. A 20-page two-color catalog of charts for J & L optical comparators has been published by the Optical Comparator Division, Jones & Lamson Machine Co., Springfield, Vt. Included are data on radius charts, grid charts, protractor charts, screw thread charts, standard inspection charts, chart rails, glass scales, blank drawing charts, combination holders for charts and photographic film, and optical comparators.



FORMFLEX

This heavy duty bench type model covers a larger engraving area than any other machine of its kind.



Panels Dr M D ROVEN Here is the most versatile machine...So simple to operate by unskilled labor.

Name Plates

Send for illustrated booklet H



NEW HERMES, Inc.

Department 27

13-19 UNIVERSITY PL. . NEW YORK 3

World's Largest Manufacturer of Portable Engraving Machines

Engineering and Production Equipment. Continental Industrial Engineers, Inc., 176 W. Adams St., Chicago 3, Ill., has issued a 12-page two-color booklet (No. 127) discussing in detail the broad scope of its services to industry. Included are many illustrations with detail descriptions of a wide variety of production lines and automatic processing equipment covering practically every industry.

Variable Speed Transmission. Revco Inc., 405 Thorpe Bldg., Minneapolis 2, Minn., has issued a four-page two-color bulletin (No. 149) illustrating and describing in detail its "Zero-Max" Transmission with infinite speed variation from zero to maximum.

Inert-Gas Shielded-Arc Welding Process designated as "Heliwelding" and said to provide for the easy joining of hard-to-weld metals is discussed in a 16page illustrated catalog (No. 9) published by the Air Reduction Sales Co., 60 E. 42nd St., New York 17, New York.

Specialized Lubricants for industrial and automotive machinery are described in a 30-page application guide (Form C1OL) distributed by the Keystone Lubricating Co., 21st & Lippincott Sts., Philadelphia 32. Pa. Included are recommendations for lubricating all types of bearings under various operating conditions. Also provided is information covering the lubrication of power generation, transmission and materials handling equipment, as well as special recommendations covering the lubrication of pump glands, valves, and other equipment subjected to contact with acids, alkalies, and moisture.

Gears. Oliver Gear & Machine Co., Inc., 1114 Niagara St., Buffalo 13, N. Y., has available a 32-page pocket-size booklet illustrating and describing a complete line of gears, including cut spur gears, cut bevel gears, cut miter gears, cut worm gears and worms, spiral gears, cut sprocket wheels, finished machine racks, cut internal gears, molded tooth gears, stub tooth gears, rawhide gears, and Micarta gears. Tables presenting information on gear prices, dimensions, and so on, as well as tables of decimal equivalents, dimensions of standard key seats for gears, and weight of round steel per inch of length, are also provided.

All Electric Unit Heaters for industry are covered as to specifications, features, typical installations, and so on, in an eight-page two-color catalog (No. EC-62) released by the Electromode Corp., 45 Crouch St., Rochester 3, New York.

Steel Hardening Compound, an activated carbon-chromium steel catalyst marketed under the designation "Hi-Speed-It" is fully described in an eightpage two-color illustrated folder issued by the Wilson Carbon Co., Inc., 60 E. 42nd St., New York 17, N. Y. Also issued is an eight-page folder giving instructions for the successful use of the compound.

Machine Tools, Spacers, and Conveyors. The Bullard Co., Bridgeport 2, Conn., has released a 12-page three-color bulletin illustrating and describing its "Cut Master" vertical turret lathes, Man-Au-Trol vertical turret lathes, Man-Au-Trol horizontal lathe, Mult-Au-Matics, Bullard-Dunn conveyors and process, and Bullard-Universal boring, drilling and milling machines.



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Open Back Inclinable Presses ranging from 90 to 250 tons in capacity are covered as to design features and specifications in a six-page two-color illustrated bulletin (No. OBI-49) issued by the Verson Allsteel Press Co., 9130 Kenwood Ave., Chicago 19, Illinois.

Air and Hydraulic Cylinders. The Hydro-Line Mfg. Co., 711 19th St., Rockford, Ill., has available a 32-page catalog containing complete engineering data on hydraulic cylinders (both high and low pressure) and air cylinders for operating pressures to 1,500 pounds per square inch.

Thread Milling Machine. The James Coulter Machine Co., Bridgeport, Conn., has issued a catalog which explains in detail the mechanics, specifications, and so on, of its "Threadmaster" Thread Milling Machine for the cutting of precision threads on a production basis.

Universal Ram-Type Hydraulic Broaching Machines designed for both internal and surface broaching, as well as press work, are fully covered in a four-page

technical bulletin (No. RP-49) available from the Colonial Broach Co., Box 37, Harper Station, Detroit 13, Michigan.

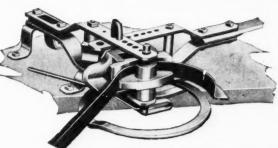
Twist Drill Price List. As a convenience to the manufacturer as well as the distributor, the Union Twist Drill Co., Athol, Mass., has released a 12-page net consumer price list on taper and straight shank twist drills, combined drills and countersinks, prentice drills, coes drills, bit stock drills, and ratchet drills.

Turbine Oils. The problems of oxidation, emulsification, foaming, and sludging as related to turbine lubrication are discussed in a four-page illustrated folder on "Turbo-Drive", a fortified turbine oil, issued by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pennsylvania.

Hydraulic Tubing. Bulletin 38 issued by the Superior Tube Co., 2101 Germantown Ave., Norristown, Pa., provides general and technical information, as well as specifications, on a line of seamless steel hydraulic tubing from ½ to 1½ inches outside diameter.

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Two-Dimensional Engraver. A bulletin released by the H. P. Preis Engraving Machine Co., 657 Route 29, Hillside 5, N. J., illustrates and describes the Model 2D-4 Panto-Engraver for general two-dimensional engraving on name plates, large panels and signs, steel dies, steel stamps, and other objects requiring precision or production machine engraving or profiling.

Abrasive Rolled Steel Floor Plate, particularly recommended for industrial floors, loading platforms and ramps, walkways, building entrances, and trench and hatch covers, is described and illustrated in an eight-page two-color booklet prepared by the Alan Wood Steel Co., Dept. W-76. Conshocken, Pennsylvania.

Face Grinder. Recommended for practically every face grinding application where flat, square surfaces are required, a face grinder with motorized spindle and 18-inch wheel is illustrated and fully described in a four-page two-color bulletin published by the Abrasive Machine Tool Co., East Providence 14, Rhode Island.

Directory of Welding Alloys. The Eutectic Welding Alloys Corp., Dept. P. 40 Worth St., New York 13, N. Y., is distributing a 1950 Directory of its various low temperature welding alloys, including rods for cast iron welding, aluminum welding, die-cast welding, cutting, steel welding, stainless steel welding, brass, bronze and copper welding, overlay jobs, and so on.



Heat Processing Machines for forging and bending are discussed as to design and characteristics in an eight-page twocolor bulletin issued by the Selas Corporation of America, Erie Ave & D St., Philadelphia 34, Pa.

Speed Reducers. Euclid Universal Machine, Inc., 15002 Woodworth Rd., Cleveland 10, Ohio, has prepared a 28-page catalog containing descriptions, illustrations, dimensions, and specifications of a complete line of speed reducers, including single and double reduction types. Illustrations and descriptions of special types of speed reducers are presented.

Air Control Valves. A four-page twocolor folder now being distributed by the Valvair Corp., 454 Morgan Ave., Akron 11, Ohio, illustrates and describes a line of air control valves for various requirements, including knob-operated, leveroperated, cam-operated, clevis-operated, foot-operated, treadle-operated, single and double-cylinder operated, and single and double-diaphragm-operated types.

General Purpose High Speed Steel known as "Unicut" is the subject of a four-page two-color brochure published by the Universal-Cyclops Steel Corp., Dept. MS, Bridgeville, Pa. The brochure provides a chemical analysis, heat treatment data, and hardening and tempering curve on Unicut, as well as information on the wide range of applications for which the steel is suited.

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#### Over the Editor's Desk

#### Will Democracy Pull Down Its Own Temple?

It is an ironic fact that the fruit of Democracy carries within it the seeds of its own ruin, and the pages of history bear testimony to more than one case where the fruit has been destroyed in the effort to get at the seeds. A prominent educator points out that twenty civilizations before our own have "strutted to their doom as their governments tried to do everything for everybody while the people were lulled into listlessness and apathy." As 1950 dawns it finds America following the same course that led these other nations to their doom. Will we come to our national senses in time, or must we—like Samson—pull the Temple down upon our own heads?

In the last ten years the dollar has lost 50% of its value. In other words, it will buy only half as much as it bought in 1939. In those ten years the price index for all commodities has jumped up 104.5%; for farm products it is up 171.8%; building materials have risen 112%, and most industrial equipment and consumer goods have risen in price on a comparable basis. The country is staggering under a national debt of \$256 billion, and the Administration is asking for more money in order to set up more projects "for the people," which will force the Federal liability even higher.

Too many people overlook the fact that the Federal Government has no money of its own; all the money it has is what it takes from the American people. And too many people are entirely unaware of the fact that the present high cost of living is due in large measure to the taxes they pay whenever they make a purchase. Of the 20 cents paid for a package of cigarettes, 9 cents goes into the tax till. Of the 26 cents (or thereabouts) paid for a gallon of gasoline,  $6\frac{1}{2}$  cents goes for taxes. There are more than 100 "hidden" taxes in the price of a suit of clothes—and there are hidden taxes in the prices of all other commodities. If the cost of government could be lowered, the cost of living could also be lowered—provided the government didn't force the payment of tribute for other services.

However, the Administration is leading the parade in the push for an enlarged welfare program. Demands are being made for health insurance and unemployment pay, life insurance, disability, severance and vacation pay, reduction in the hours worked, and so on. A survey made by the Economic Research Department of the Chamber of Commerce of the United States, covering 203 large and medium-sized companies, showed that hidden payroll costs—pensions, social security, vacations, holidays, and so on—average 20.5 cents per hour worked and cost \$424 a year per worker. The aggregate cost of these fringe benefits amounts to 15.4 per cent of the total wage bill of the reporting companies. All of it comes out of the pockets of the ultimate consumers, and still we wonder why living costs are so high.

Now the Administration, through its so-called steel "fact-finding board," has set a precedent for nation-wide pension plans, with the implication that the costs should be borne by the employers. In studying the effects of such a program upon living costs, the first point to be remembered is that the cost of such pensions must be added to the cost of the product and must therefore be paid by the buyers of the product, who in turn will pass it on to the buyers of their products, who in turn will pass it on—and

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so on indefinitely until every consumer has made his contribution to the cost of that pension. No one escapes; even the buyer of groceries will pay a little extra to pay for the steel cash register, purchased by the grocer who must pay a little extra to the cash register manufacturer who buys steel, who must pay a little extra to the steel manufacturer so that he can meet the costs of pensions for his union workers.

If all the unions obtain similar pensions for their members, all of the costs of these pensions will—in the end—be paid for by the public, and the costs of living will mount accordingly. Thus this form of social security will degenerate into a scheme of special privilege for a powerful group that in the aggregate constitutes only about one-fourth of the labor force, which means that the protection of the other three-fourths will be placed in jeopardy. And this three-fourths will pay the taxes necessary to meet the costs of the pensions for the one-fourth.

To be fair to all, the unions' demands for \$100 a month pensions should be applied to all who are the age of sixty-five or over in this country, or about 10 million persons. The cost for this program would be \$12 billion a year at the present time, but it is estimated that by 1960 there will be 18 million persons in this country sixty-five years of age or older, for whom the cost of \$100-a-month pensions would amount to \$21.6 billions a year.

The economists of the First National Bank of Boston point out that we are building up a system of security that penalizes the younger generation, due to the fact that an increasing proportion of income will be required to provide for the growing number of non-productive workers. They further warn that "the organized pressure for pensions can become a ghoulish nightmare that saps the vitality of the younger generation."

It is high time that the union member pause in his efforts to gouge the other fellow and give some thought to the end results of his thinking. In the first place, the policy of forcing an employer to pay for pensions and other benefits, when he knows that not the employers, but other citizens, will have to pay the bill, is unfair and therefore dishonest. If it is his attitude that others have the same right, and all other people proceed to do the same thing, everyone will be paying for his own benefits and the costs of administration will be so high that we will find ourselves in the same condition as the nations across the ocean—nations to whom the American people are now sending money and food and clothing.

After some years of experimenting with a "welfare state" the people of Australia and New Zealand have seen the light and have thrown out the Socialist government. If the American people are as smart as their brothers across the seas, they will assume the responsibility for their own welfare and head off the impending catastrophe before it gathers any more force.

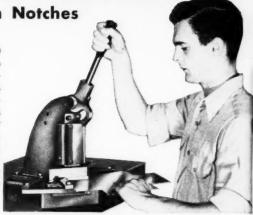
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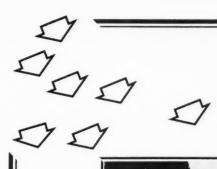
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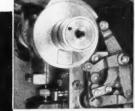


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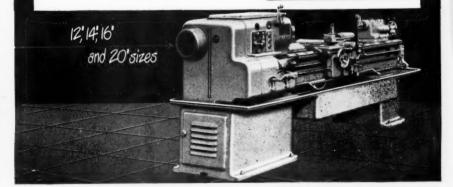
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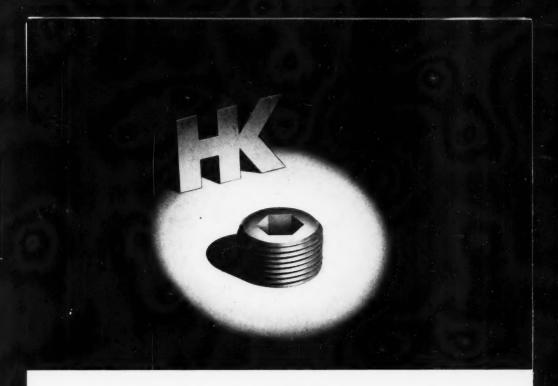
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